U.S. Army
Corps of Engineers

New England District
Concord, Massachusetts

U.S. Environmental
Protection Agency

New England Region
Boston, Massachusetts

2007 ANNUAL INSPECTION, MONITORING AND MAINTENANCE REPORT
1 ½ MILE REMOVAL REACH
GENERAL ELECTRIC (GE)/HOUSATONIC RIVER SITE
Environmental Remediation Contract
GE/Housatonic River Project
Pittsfield, Massachusetts

DCN: GE-010808-ADSO

January 2008

Contract No. DACW33-00-D-0006

WESTON SOLUTIONS

Executive Summary

This report presents the results of the restoration monitoring, the post-remediation sampling and a summary of all miscellaneous repair and maintenance activities performed in 2007 within the 1½-Mile Reach Removal Action of the General Electric - Pittsfield/Housatonic River Site in Pittsfield, Massachusetts (1½-Mile Reach). The restoration monitoring work was performed by Weston Solutions, Inc., and Weston subcontractor Woodlot Alternatives, Inc. The restoration monitoring work was performed according to the 1½-Mile Reach Restoration Monitoring Plan (Woodlot, 2004) to assess whether the specified restoration performance standards were achieved. Habitat based restoration features assessed include aquatic habitat enhancement structures, riverbank soil restoration, riverbank re-vegetation, non-riverbank re-vegetation and the presence of invasive species. The non-habitat based restoration features include riverbed and riverbank riprap, articulated concrete blocks (ACB) and ancillary items. The post-remediation sampling work and the miscellaneous repair and maintenance work was performed by Weston, and various subcontractors of Weston. This report also provides recommendations for ongoing monitoring and maintenance actions.

Areas monitored in 2007 included the Phase 1 and Transition Phase, Phase 2 and Phase 3 areas.

The results of the 2007 restoration monitoring results indicate that the re-vegetation restoration work generally achieved the applicable performance standards within the monitored areas of the 1½-Mile Reach. The installed trees and shrubs appeared healthy and were growing vigorously. In addition, substantial recruitment of "volunteer" native trees, particularly eastern cottonwood (*Populus deltoides*) and box elder (*Acer negundo*) was observed. For the spring 2007 monitoring visit observed tree survivorship did not meet the performance standard of 80% in two monitoring areas. First, monitoring area Dawes to Pomeroy (East), the tree survivorship did not meet the standard because of monitoring plot 3-E-1. Second, monitoring area Dawes to Pomeroy (West), the tree survivorship did not meet the standard because of plot 3-W-1. The performance standard was not met in those two plots due to the apparent loss of trees within the plots since the summer 2006 vegetation monitoring event. Both 3-W-1 and 3-E-1 are located in residential areas and appear to be negatively affected by human activity. Trees and shrubs were tallied in all areas adjacent to these two plots, including the trees and shrubs within the plots, and the information was used to assess tree densities within a greater section of this reach and to determine the necessity for supplemental planting. The supplemental planting was completed in summer 2007. Also, it was recommended that the current sample area/plots be modified and enlarged in order to better represent the entire residential area the plots are within. Since the spring 2007 additional planting and the re-adjustment of the monitoring plots, the performance standard of 80% in the two monitoring areas, Dawes to Pomeroy (East) and Dawes to Pomeroy (West), was achieved (See Summer 2007 inspection results). For the summer 2007 monitoring visit, tree and shrub density/survivorship was above the 80% performance standard for all monitoring areas.

The meander survey performed during the spring and the summer 2007 monitoring visits revealed increased tree and/or shrub mortality in 3 distinct areas, one within the west riverbank

of the Lyman Street to Elm Street reach, one on the west and one on the east riverbank of the Elm Street to Dawes Avenue reach. The cause of mortality on the Lyman Street to Elm Street reach was not readily apparent. Mortality in the Elm Street to Dawes Avenue reach was most probably caused by competition for resources with herbaceous species as well as previous herbivory by the forest tent caterpillars. Replanting was performed during the summer and fall 2007 planting season to address the plant mortality.

In addition, supplemental vegetation monitoring work was performed during the spring and the summer 2007 monitoring visits, to assess tree and shrub health within non-riverbank planting areas on residential, commercial and recreational properties within the 1.5-Mile Reach. Based on the spring and summer 2007 monitoring visits, several trees were re-planted within the upland areas.

Herbaceous cover was at or above 95 percent and therefore achieved the performance standard, in all but three of the monitoring plots. Monitoring plot 1-E-3, 2-W-1 and 4-W-2 exhibited less than the 95 percent requirement. The soil was stable with no indication of erosion in plots 1-E-3 and 4-W-2 and no immediate action was taken, the plots will be re-evaluated in spring 2008. Re-seeding of Plot 2-W-1 and the adjacent area was performed in fall 2007.

All monitoring plots achieved the applicable standard of less than the maximum of 5 percent invasive plant cover. However, a modified herbicide treatment regime was recommended to reduce impacts to desirable native species.

The riverbank soil restoration performance standard was also achieved in the monitored areas with no substantial areas of riverbank erosion, which likely benefited from the success of the re-vegetation work. Areas with minor erosion were repaired through out the year.

Observations of the riverbed and riverbank riprap armor and ACB in the 1.5-Mile Reach indicate that the riverbed and riverbank riprap and ACB were in as-built condition with an exception of couple of areas where minor riprap movement occurred. The areas where minor riprap movement occurred have been restored to as-built condition through-out the year.

Aquatic habitat structures were also found to be generally in as-built condition, and all ancillary items, including retaining walls, fences and outfalls were found to be in as-built condition, while accounting for normal wear and tear.

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1.0 Purpose

This report presents the results of the restoration monitoring performed in 2007 within the 1.5-Mile Reach Removal Action of the General Electric-Pittsfield/Housatonic River Site in Pittsfield, Massachusetts (1 ½ -Mile Reach). The monitoring work was performed by Weston Solutions, Inc., and Weston subcontractor Woodlot Alternatives, Inc. (Woodlot). The work was performed in accordance with the 1 ½ -Mile Reach Restoration Monitoring Plan (Monitoring Plan) (Woodlot, 2004) for project features including aquatic habitat enhancement structures, riverbank soil restoration, riverbank re-vegetation, non-riverbank re-vegetation, riverbed and riverbank armor (riprap), articulated concrete blocks (ACB) and ancillary items.

This report also summarizes the post-remediation sampling activities and all of the miscellaneous maintenance and repair work that was performed during 2007 along the 1 ½ -Mile Reach. The maintenance and repair work was performed by Weston, and various subcontractors of Weston.

2.0 Introduction

The purpose of the annual restoration monitoring is to document the performance of the remediation and restoration work performed on the 1 ½ -Mile Reach, including work intended to achieve both habitat and non-habitat based objectives. The restoration monitoring work was performed in accordance with the Monitoring Plan, which presents a program of maintenance and performance restoration monitoring for assessing and documenting the performance of features constructed as part of restoration activities within the 1 ½ -Mile Reach. Specific features covered by the Monitoring Plan include bank stabilization, riprap, aquatic enhancements, riverbank soil restoration, riverbank re-vegetation, invasive plant species control, and ancillary features including paved areas, retaining walls, and fences.

This report describes restoration monitoring work performed in 2007 in accordance with the Monitoring Plan, including the performance results of aquatic habitat enhancement structures, riverbank soil restoration, riverbank re-vegetation, and riverbed and riverbank armor (riprap), and ancillary features such as fences, pavement and walls. Performance results are based on observations made during regular inspections by Weston on-site personnel during 2007. Also, inspections performed by Woodlot during May and August of 2007, as well as the post-1,500 cubic-feet-per-second (cfs) hydrologic event inspection, as measured at the United States Geological Survey (USGS) Coltsville stream gaging station on the East Branch of the Housatonic River, Massachusetts (USGS Station No. 01197000).

3.0 Restoration Performance Standards

Brief descriptions of applicable restoration performance standards for the assessment of habitat and non-habitat based objectives applied as part of the 2007 restoration monitoring work are presented below. The Monitoring Plan presents full descriptions of the applicable restoration performance standards and follow-up corrective actions if restoration performance standards are not achieved.

3.1 RESTORATION PERFORMANCE STANDARDS FOR HABITAT BASED OBJECTIVES

3.1.1 Aquatic Habitat Enhancement Structures

The restoration performance standard for aquatic habitat enhancement structures is defined as no significant erosion or movement of the structures or adjacent riprap. Note that while benefits to aquatic habitat associated with the aquatic habitat enhancement structures will be documented, improved aquatic habitat itself is not a restoration performance standard.

3.1.2 Riverbank Soil Restoration

The restoration performance standard for riverbank soil restoration is defined as no significant erosion (e.g., ruts, gullies, washouts, or sloughing) of soils.

3.1.3 Riverbank Re-vegetation

The restoration performance standard for riverbank re-vegetation includes:

- Survivorship of planted trees or shrubs (except as discussed below) shall be equal to or greater than 80 percent. The normal combined planted tree and shrub density is 1,460 per acre (730 trees and 730 shrubs). In areas where Geoweb® was installed as a slope-stabilization measure, the combined plant density was reduced to 1,230 per acre (500 trees and 730 shrubs).
- If shrubs are planted as a hedge, the restoration performance standard shall be 100 percent survivability or, considering additional growth of non-planted shrubs, a continuous hedge.
- Areal cover for herbaceous vegetation shall be equal to or greater than 95 percent cover outside the foliar coverage of the trees. There is no restoration performance standard for individual species within the herbaceous seed mix.
- Areal cover of invasive plant species listed in Attachment A of the Monitoring Plan shall be less than 5 percent of the restoration monitoring area. Any invasive species present in excess of 5 percent will be removed by appropriate means.

3.2 RESTORATION PERFORMANCE STANDARDS FOR NON-HABITAT BASED OBJECTIVES

3.2.1 Riverbank and Riverbed Riprap

For riprap placed in the river channel, riverbank, or swales, the restoration performance standard is defined as no significant movement of the riprap or reduction in riprap thickness that threatens the stability of the riverbanks or river channel or results in the erosion of underlying soils or sediment. For riprap placed in swales, the restoration performance standard includes no movement of riprap that results in the exposure of the underlying geotextile fabric.

3.2.2 Ancillary Items

For ancillary items such as fencing, paved areas, and walls, the performance standard is defined as being in as-built condition, while taking into account normal wear and tear.

4.0 Restoration Monitoring Methods

The Monitoring Plan describes the restoration monitoring methods used to assess and document the restoration performance standards for each constructed restoration features. Brief descriptions of the restoration monitoring methods used for the applicable features are summarized below.

4.1 RESTORATION MONITORING OF AQUATIC HABITAT ENHANCEMENT STRUCTURES

Aquatic habitat enhancements structures were monitored to evaluate the structural stability and functional value of the features and to determine whether corrective actions are required. Monitoring included visual inspections to document characteristics of the structures, such as shape and location, and to document characteristics of adjacent sections of riverbed and riverbank riprap. The purpose of the restoration monitoring is to (1) determine if there was significant erosion or movement of the enhancement structures; (2) determine if the riprap is experiencing scour due to the presence of the aquatic habitat enhancement structures and (3) document apparent functional value of the structures. The functional value monitoring included observations of flow speed and depth variability, sediment deposition and scour, and the occurrence of riverine fauna in the vicinity of the structures. While the function of these structures is not a restoration performance standard, restoration monitoring provides a determination of whether the habitat-based objectives of the project are being achieved.

The Monitoring Plan specifies that restoration monitoring of the aquatic habitat enhancement structures include a minimum of two site visits per year, one visit after the high flows in the spring and one during a period of low flow (i.e., typically in July or August). Restoration monitoring is also required following flows in excess of 1,500 cfs, as measured at the USGS Coltsville stream gaging station. Since the 1,500 cfs high flow event in 2007 occurred in April, which is what the typical schedule of the spring high flow event would be, the spring high flow event and the 1,500 cfs high flow event riprap inspections were covered concurrently with one another. The low flow riprap inspection was performed in August 2007.

4.2 RESTORATION MONITORING OF RIVERBANK SOIL RESTORATION

Monitoring of riverbank soil restoration consisted of visual observations to determine compliance with the applicable performance standard of no significant erosion (e.g., ruts, gullies, washouts, or sloughing). The Monitoring Plan specifies that the timing of the restoration monitoring visits be similar to that for the aquatic habitat restoration structures, with visits after

high flows in the spring and during low flow in late summer. In addition, site visits are required after flow events exceeding 1,500 cfs as measured at the USGS Coltsville stream gaging station or when the water level rises to the level of the riverbank soils. Since the 2007 1,500 cfs high flow event occurred in April, which is what the typical schedule of the spring high flow event would be, the spring high flow event and the 1,500 cfs high flow event riprap inspections were covered concurrently with one another. The low flow riprap inspection was performed in August 2007.

4.3 RESTORATION MONITORING OF RIVERBANK AND NON-RIVERBANK REVEGETATION

Restoration monitoring of riverbank re-vegetation included quantitative assessments of plant survivorship, herbaceous cover and invasive plant cover in designated monitoring sub-areas, and qualitative assessments of riverbank vegetation using meander surveys in planted areas. This work included two restoration monitoring visits consisting of a visit in the spring prior to the beginning of the growing season and a visit in the mid- to late-summer during the peak of the growing season. The purpose of the spring visit was to assess conditions, measure plant survivorship and assess compliance with the performance standards. The purpose of the summer visit was to assess conditions, measure plant survivorship, areal herbaceous vegetation cover and the invasive species cover and to assess compliance with the performance standards. Both the spring and the summer inspections will also determine if corrective actions or maintenance are required.

4.3.1 Trees and Shrubs Riverbank

The restoration monitoring of trees and shrubs on the re-vegetated riverbank included the quantitative assessments of plant survivorship in designated sub-areas and qualitative assessments of riverbank vegetation using meander surveys in planted areas.

For vegetation monitoring purposes, the 1½-Mile Reach has been divided into four monitoring sub-reaches between the Lyman Street and the confluence of the East and West Branches of the river. These sub-reaches are delimited by the four bridge crossings in the 1½-Mile Reach (Lyman Street, Elm Street, Dawes Avenue, and Pomeroy Avenue, respectively, from upstream to downstream) and the confluence of the East and West Branches of the river. The four sub-reaches represented by these five delimiters are numbered 1 through 4, respectively, moving downstream from the Lyman Street Bridge. In addition, each of the four sub-reaches was divided into monitoring areas defined by the "east" (river-left [looking downstream]) and "west" (river-right) sides of the river, with three sub-area/plots established on each side of the river within each monitoring area. This resulted in a total of 8 monitoring areas and 24 permanent monitoring plots (3 plots in each monitoring area) to be used for the quantitative assessment of the vegetation monitoring.

The plots were established in such a way that they represent between 10% and 20% of the total of each monitoring area and provide an unbiased representation of the entire monitoring area. Within each monitoring area, surface area estimates were acquired for both the non-Geoweb® re-vegetation area and the Geoweb® re-vegetation area. Then, a proportional number of plots

were established in both the non-Geoweb® and Geoweb® areas, to make sure that the plots represent approximately 10% of each.

The 24 permanent monitoring plots were established based on construction as-builts. A majority of the sample plots were laid out prior to the spring 2007 inspection, and are permanent monitoring sample plots. The 6 plots between Pomeroy Avenue Bridge and the Confluence were established during the spring 2007 inspection. Therefore, for the future monitoring, each monitoring plot has assigned dimensions and target planting densities.

To quantify plant survivorship, planted trees and shrubs were counted by walking through each monitoring plot and determining the number, type, and condition of the installed plants. At the completion of the monitoring, the results of the quantitative survey were used to determine the number of live and dead plants in each plot. Live tree and shrub totals were summarized and then divided by the number of installed plants to calculate plant survivorship in each plot. Next, the plant survivorship within the monitoring plots was averaged together to calculate the plant survivorship within the monitoring area. For averaging purposes and comparison to Performance Standards, survey results from the Geoweb® and non-Geoweb® plots in each monitoring area were averaged separately.

The qualitative assessments of riverbank re-vegetation were performed using meander surveys in each designated restoration monitoring area outside of the sample plots. The meander survey was also used to determine whether the restoration monitoring sample plots assessed as part of the quantitative assessments were representative of the entire planting area.

4.3.2 Herbaceous Vegetation Cover

Restoration monitoring of herbaceous vegetation cover consisted of visual observations of planted areas and qualitative assessments of herbaceous areal coverage. This work included one restoration monitoring visit in mid- to late-summer. Herbaceous cover was determined by walking through each restoration monitoring area and visually estimating the total cover to the nearest 5 percent.

4.3.3 Invasive Plant Species Cover

Invasive plant species were monitored to evaluate compliance with applicable restoration performance standards and to determine whether corrective actions are required. Invasive plant species for this work are those listed by Weatherbee *et al.* (1998) for the Commonwealth of Massachusetts (Appendix A).

Invasive plant areal cover estimates were performed in the summer concurrently with the summer plant survivorship and herbaceous vegetation cover assessment. Quantitative assessments of invasive plant cover were performed by walking through planting areas and visually estimating the total invasive plant cover to the nearest 5 percent in a process similar to that used to determine herbaceous coverage.

4.4 RESTORATION MONITORING OF RIPRAP

The riprap restoration monitoring consisted of visual observations to document readily apparent characteristics of the riprap, such as fairness of the slope, sloughing, erosion, and size distribution of the riprap. Usually, this monitoring occurs twice a year, one visit after the high flows in the spring and one during a period of low flow (i.e., typically in July or August). Also, as described in the Monitoring Plan, the riprap monitoring is performed after any flow event that exceeds 1,500 cfs as measured at the USGS Coltsville stream gaging station. Since the 2007 1,500 cfs high flow event occurred in April, which is what the typical schedule of the spring high flow event would be, the spring high flow event and the 1,500 cfs high flow event riprap inspections were covered concurrently with one another. The low flow riprap inspection was performed in August 2007.

4.5 RESTORATION MONITORING OF ANCILLARY ITEMS

The monitoring of ancillary items consisted of visual observations to document to condition of installed structures and surface, such as significant cracks, movement, or indications of deviation from as-built condition beyond that which would be expected from normal wear and tear on structures exposed to local conditions.

5.0 Restoration Monitoring Results

This section presents the results of the restoration monitoring work performed in 2007 by Weston and Woodlot, including the assessment of whether restoration features constructed as part of remediation activities within the 1½-Mile Reach met the specified restoration performance standards. Restoration features assessed include aquatic habitat enhancement structures, riverbank soil restoration, riverbank re-vegetation, riverbed and riverbank riprap, and ancillary items. Recommendations to maintain or enhance restoration performance standards for these restoration features are also provided.

5.1 SEMI-ANNUAL RESTORATION INSPECTIONS

Woodlot performed the spring and summer restoration monitoring inspections along the 1 ½ - Mile Reach. The inspections took place during the weeks of May 14 and August 13, 2007 and the restoration monitoring of trees and shrubs on the re-vegetated riverbank, herbaceous cover, and invasive plant cover.

Also, supplemental vegetation monitoring work was performed to assess tree and shrub health within non-riverbank planting areas on residential, recreational and commercial properties within the 1.5-Mile Reach. The following properties were inspected Parcel I8-24-1, Parcel I9-5-13, Parcel I6-1-66, Parcel I6-1-67, Parcel I6-1-68, Parcel I6-1-69, and Fred Garner Park (Parcel I7-1-101). The results of the 2007 monitoring work are summarized below.

More detailed descriptions of each inspection event, along with associated tables, maps and field notes are included in the spring and summer inspection reports, which are attached as Appendices B and C respectively.

5.1.1 Spring 2007 Inspection

The spring 2007 vegetation monitoring and vegetation monitoring plot establishment in the 1½-Mile Reach was performed during May of 2007. The first task performed was the establishment of the last 6 permanent monitoring plots between Pomeroy Avenue Bridge and the confluence on the east and west branch of the Housatonic River. Once the last 6 plots were established and staked out, the monitoring inspections were performed.

Table 1 provides a summary of the results of the spring 2007 vegetation monitoring event for trees and shrubs, and includes the summer 2006 results for comparison. The performance standard for trees and shrubs is 80 percent survivorship. In most monitoring areas, exact numbers of planted trees and shrubs were not available, so survivorship was estimated by comparing the current plant density to the expected plant density based on the design. Several areas within 1.5 Mile Reach, the planting schemes did not follow the standard planting densities due to requests of residential property owners or the physical conditions of the riverbanks. In those areas the exact number of trees and shrubs planted was known. If a monitoring plot was located within those areas where the standard planting densities were not followed, and the number of trees and shrubs was known, the assessment of the plot was based on the original number of plants planted. Such plots included 1-E-3, 3-W-2, 3-W-3, 3-E-3 and 4-E-2.

Table 1. Comparison summary between Summer 2006 and Spring 2007 Monitoring Events

Monitoring Area	Performance Standard Summary					
	Summer 2006			Spring 2007		
	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm (West) (1-W)	85%	125%	NA	103%	152%	NA
Lyman-Elm (East) (1-E)	77%	103%	100%*	102%	137%	100%*
Elm-Dawes (West) (2-W)	102%	146%	287%	188%	140%	152%
Elm-Dawes (East) (2-E)	96%	124%	NA	91%	113%	NA
Dawes-Pomeroy (West) (3-W)	120%	100%*	90%	138%	100%*	60%
Dawes-Pomeroy (East) (3-E)	145%	88%	188%	137%	72%*	212%
Pomeroy-Confluence (West) (4-W)	NA	NA	NA	108%	115%	NA
Pomeroy-Confluence (East) (4-E)	NA	NA	NA	215%	119%*	152%

* Indicates percent survivorship as compared to the number of actual trees and shrubs planted. Applies to one plot or two plots out of the three plots within a monitoring area.
Note: Shaded areas do not meet the Performance Standard

Overall, healthy growth of planted species along with significant contribution from volunteers was observed during the monitoring work. Applicable performance standards for survivability of trees and shrubs were met in all monitoring areas except for two; 3-E and 3-W.

Tree density in the Geoweb ® section of the Dawes to Pomeroy West Monitoring Area (3-W) was below the 80% performance standard. This is due to the apparent loss of 2 box elder trees within Monitoring Plot 3-W-1 since the summer 2006 vegetation monitoring event. Tree density was below the 80% performance standard for the non- Geoweb ® section of the Dawes to Pomeroy East Monitoring Area (3-E) because 4 fewer trees were recorded in Monitoring Plot 3-E-1 this year. Both 3-W-1 and 3-E-1 are located in residential areas and appear to be negatively affected by human activity. A large compost pile has been created within Monitoring Plot 3-E-1 and a large Norway maple shades much of this plot. Trees and shrubs were tallied in all areas adjacent to these plots, including the trees and shrubs within the plots, and the information was used to assess tree densities within a greater section of this reach and to determine the necessity for supplemental planting. On the west riverbank all plants were counted on Parcels I7-2-46, I7-2-45 and I7-2-44, and on the east riverbank all plants were counted on Parcels I7-3-12 and I7-3-11. Based on the additional information gathered it was recommended that supplemental plantings of 1 box elder (*Acer negundo*) and 3 eastern cottonwoods(*Populus deltoides*) be performed on the east riverbank and supplemental planting of 4 box elders and 2 silver maples *(Acer saccharinum)* on the west riverbank. High shrub density inhibits the ability to plant increased numbers of additional trees.

It was also recommended that the current sample area/plots be modified and enlarged in order to better represent the entire residential area the plots are within. Therefore, the assessment in the future will be based on a larger area with target densities based on the current live number of plants plus the recommended additional trees planted in the spring 2007. This was reflected in the summer 2007 inspection conducted in August 2007.

During the meander survey, one area of apparent increased tree and/or shrub mortality was observed within the west riverbank of the Lyman Street to Elm Street reach and one area was observed on the west riverbank of the Elm Street to Dawes Avenue reach. The cause of mortality on the Lyman Street to Elm Street reach was not readily apparent. Mortality in the Elm Street to Dawes Avenue reach was most probably caused by competition for resources with herbaceous species as well as previous herbivory by the forest tent caterpillars. Shrubs in this area were typically greater than 4 feet in height (above the existing herbaceous layer). A large section of this reach was previously covered with hedge bindweed in 2005 and 2006. It should also be noted that trees and shrubs in the area were heavily infested with forest tent caterpillars in 2006 and most of the infested trees and shrubs were completely denuded of foliage last spring. Tree and shrub mortality was likely a combination of factors including herbivory by the forest tent caterpillar and competition for light and water from herbaceous growth (especially hedge bindweed). In both of the areas that experienced high rates of tree and shrub mortality, dead trees and shrubs should be replaced with eastern cottonwood and box elder trees. These replacement species are recommended because of their rapid growth rates and tolerance for drier conditions.

Trees along the upstream end of the west riverbank between Lyman Street Bridge and Elm Street Bridge suffered observable damage resulting from beaver herbivory in the past. Tree stumps left by beavers are exhibiting extensive re-sprouting from the base. Many of the protective tree cages are too short to adequately protect trees from beaver herbivory in this area. Approximately 52 trees (all black willow [*Salix nigra*] and box elder) were impacted by beaver activity or are

likely to be impacted by beavers in the future if the height of the protective tree cages is not increased. It was recommended that the trees be replaced or the protective cages expanded.

Also, in comparison to summer 2006, a significant decrease of trees was observed in plot 2-W-3. The overall % target density was achieved; however further research was performed to determine the reason for the decrease. Further review of the data sheets and field notes revealed that the increased numbers of trees present in the summer of 2006 was due to a very high number of volunteer trees observed at the time. It was determined that no additional actions were necessary to address this area.

Quantitative monitoring of herbaceous coverage and invasive plants was not conducted during the spring 2007 inspection. However, during the meander survey the presence of Japanese knotweed (*Polygonum cuspidatum*) was observed throughout the 1 ½ Mile reach. Other invasive species noted include Norway maple (*Acer platanoides*) and multiflora rose (*Rosa multiflora*). Also, the emergence of hedge-bindweed, or "false morning glory", (*Calysegia sepium*) was observed between Elm Street and Dawes Avenue. This vine has previously been a problem within this area. While this plant is not listed as an invasive plant in Appendix A, it occurs in both native and introduced forms (Gleason, 1991), and it was recommended that the removal be performed.

Also, during the spring 2007 monitoring inspection the need for the several tree and tree cage maintenance activities was noted. Trees that have grown through the wire mesh of the tree protective cage will require pruning. Expansion of the protective tree cage and adjustment of interlocking tree guards/ties to allow for tree growth was recommended. In cases where the interlocking tree guards/ties are not present, the tree guards needs to be installed to centralize the trees within their cages to prevent the trees from rubbing and damaging themselves on the tree protective cages. Neglecting the maintenance of interlocking tree ties will most likely result in tree mortality. The need to maintain and re-stake of tree cages that have fallen down and to remove cages from around dead trees was also recommended.

In addition, supplemental vegetation monitoring work was performed to assess tree and shrub health and survivability within non-riverbank planting areas on residential, recreational and commercial properties within the 1.5-Mile Reach. The survivability requirement for the non-riverbank trees and shrubs was 100%. The following properties were inspected Parcel I8-24-1, Parcel I9-5-13, Parcel I6-1-66, Parcel I6-1-67, Parcel I6-1-68, Parcel I6-1-69, and Fred Garner Park (Parcel I7-1-101).

In general all trees and shrubs in non-riverbank areas appeared healthy and to be growing vigorously. A total of 12 large trees were found to be dead and were to be replaced. The following trees and shrubs were found to be stressed and recommended for further observation: One red maple (*Acer rubrum*) and two white birches (*Betula papyrifera*) on Parcel I6-1-66 and one spirea shrub stressed on Parcel I6-1-68.

On Parcel 7-1-101 (Fred Garner Park), one hemlock tree (*Tsuga canadensis*) was noted to have 2 main stems, of which one is dead. While the majority of white pines (*Pinus strobus*) planted in 2006 appeared to be healthy, a form of mealy bug was noted on most of these pines. Mealy bug was also observed on native white pines in the area. Two white pines were moderately stressed

with general needle drop observed on one of these. At the time of inspection, new growth was observed on stressed white pines and it is likely that these pines will survive. One sugar maple was also observed to be moderately stressed but will likely survive.

The following actions were recommended and implemented during the summer of 2007:

Riverbank Planting Areas

- Continue invasive plant control work, including addressing the presence of Japanese knotweed, multiflora rose, Norway maple, garlic mustard (*Alliaria petiolata*), and common reed (*Phragmites australis*). Remove false hedge bindweed periodically from tree cages. In addition, perform grapevine removal from the area adjacent to the parking lot of Harry's Supermarket that is encroaching upon planted trees.
- Perform supplemental plantings of trees in areas that have experienced high tree and shrub mortalities on west banks of Monitoring Area 1 (24 trees) and Monitoring Area 2 (57 trees). Recommended species for replacement are box elder and eastern cottonwood.
- Perform supplemental plantings of box elder, eastern cottonwood, and silver maple (52 trees) on west bank of Monitoring area 1 to replace trees that have been impacted or are likely to become impacted by beavers as a result of installation of short protective cages.
- Perform supplemental plantings of 1 box elder and 3 eastern cottonwood on Parcel I7-3-12; 1 box elder on Parcel I7-2-46; 1 box elder and 1 silver maple on Parcel I7-2-45; and 2 box elders and 1 silver maple on Parcel I7-2-44.
- Remove protective cages from all shrubs as soon as possible.
- Perform pruning of tree branches growing through protective cages as soon as possible.
- Place tree guards around box elders that are shorter than tree cages.

Non-Riverbank Planting Areas

- Prune dead main stem on Hemlock in Fred Garner Park (Parcel 7-1-101)
- Plant 4 Red Oaks as replacements in Fred Garner Park (Parcel 7-1-101)
- Plant 2 Red Oaks and 2 Red Maples on Parcel I6-1-66 to replace the 2 dead White Birch and 2 dead Balsam Fir
- Plant 2 Dark American Arborvitaes on Parcel I9-5-13
- Plant 1 Red Maple on Parcel I8-24-1 to replace the dead Balsam Fir
- Plant 1 Hemlock On Parcel I6-1-68

5.1.2 Summer 2007 Inspection

The summer 2007 monitoring of tree and shrub survivorship in the 1½-Mile Reach was performed during August of 2007. A breakdown of the monitoring results by monitoring area is provided in Table 2. Table 2 also includes the spring 2007 results for comparison purposes.

Table 2. Comparison summary between Spring 2007 and Summer 2007 Monitoring Events

Monitoring Area	Performance Standard Summary					
	Spring 2007			Summer 2007		
	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm (West)	103%	152%	NA	103%	179%	NA
Lyman-Elm (East)	102%	137%	100%*	110%	127%	100%*
Elm-Dawes (West)	188%	140%	152%	198%	142%	274%
Elm-Dawes (East)	91%	113%	NA	91%	108%	NA
Dawes-Pomeroy (West)	138%	100%*	60%	126%	104%*	108%*
Dawes-Pomeroy (East)	137%	72%*	212%	147%	104%*	212%
Pomeroy-Confluence (West)	108%	115%	NA	104%	125%	NA
Pomeroy-Confluence (East)	215%	119%*	152%	203%	166%*	152%

* Indicates percent survivorship as compared to the number of actual trees and shrubs planted. Applies to one plot or two plots out of the three plots within a monitoring area.

Tree and shrub density/survivorship were above the 80 percent performance standard for all monitoring plots. Volunteer tree species occurring in these plots were not used in calculating the observed densities. Monitoring plots 3-W-1 and 3-E-1, which did not meet the performance standard in spring 2007, were enlarged in order to better represent tree and shrub densities within residential areas of this reach. Also, additional trees were planted in those areas in summer 2007. The new, resulting tree and shrub densities as shown in Table 3 in Appendix C and will serve as target densities for these plots in future vegetation monitoring surveys. In the summer 2007 the two plots met the performance standard.

Four shrubs within monitoring plot 4-W-3 were apparently mowed by the property owner. Shrub density within this plot is still exceeds the performance standard. Lawn debris was observed to have been deposited on tree and shrub plantings behind a private residence between monitoring plots 3-W-2 and 3-W-3.

Overall, healthy growth of planted species along with significant contribution from volunteers was observed during the monitoring event. Exceptions occurred where herbicide treatment apparently impacted planted trees and shrubs. Larger trees that were impacted by herbicide may have uptaken herbicide from soils or herbicide may have entered through recent pruning cuts. Some plant species that were apparently targeted include native species such as staghorn sumac (*Rhus hirta*) and common horsetail (*Equisetum arvense*). Other species that were targeted are considered invasive in Massachusetts (i.e., cypress spurge (*Euphorbia cyparissias*), smooth bedstraw (*Galium mollugo*), common mullein (*Verbascum thapsus*), and spotted knapweed (*Centaurea biebersteinii*)), but typically require full sunlight and may not be a problem once the tree canopy closes in. Although the presence of invasive species is not desirable within restoration planting areas, some modification of the herbicide treatment regime is advisable due to the observed losses of planted stock and herbaceous cover. Woodlot recommended that herbicide not be utilized within 3 feet of any native tree or shrub. Woodlot also recommended that the list of targeted invasive species be limited to Japanese knotweed, purple loosestrife, common reed, oriental bittersweet (*Celastrus orbiculata*), and invasive woody species including Norway maple, black locust(*Robinia pseudoacacia)*, common buckthorn (*Rhamnus cathartica*),

glossy buckthorn (*Frangula alnus*), Morrow's honeysuckle (*Lonicera morrowii*), border privet (*Ligustrum obtusifolium*), multiflora rose, and others. Herbicide spray should not be applied under windy conditions which may contribute to mortality of desirable species by spray drift.

Approximately 16 dead trees were observed on the east riverbank adjacent to STA 532+50. It was recommended that these trees be replaced.

Invasive species cover was below 5 percent in all monitoring plots (see Appendix C, Table 2) and achieved the applicable performance standard. Invasive species encountered within monitoring plots included purple loosestrife (*Lythrum salicaria*), Japanese knotweed, Multiflora rose, oriental bittersweet, spotted knapweed, common mullein, reed canary-grass (*Phalaris arundinacea*), and cypress spurge. Individuals and populations of these species were frequently encountered above and below the planting areas (e.g., purple loosestrife growing in riprap), but were not included in calculations. Even though the performance standard was met, it is recommended that populations of invasive species be controlled if possible to reduce the invasion rate of restored planting areas. As, suggested above, a modified herbicide treatment regime is recommended to reduce impacts to desirable native species.

Percent herbaceous cover was below the 95 percent performance standard within 3 plots (see Appendix C, Table 2). Monitoring plot 1-E-3 (80% herbaceous cover) exhibits stabilized soils with a potentially robust seed bank. No action is recommended for monitoring plot 1-E-3. Monitoring plot 2-W-1 (60% herbaceous cover) exhibits unstable soils with a seed bank potentially high in hedge bindweed. Re-seeding with conservation seed mix and mulching monitoring plot 2-W-1 is recommended. Monitoring plot 4-W-2 (90% herbaceous cover) exhibits relatively stable, but highly mineral (sandy) soils. It is recommended that this location be re-evaluated in spring 2008 to assess the necessity for restorative actions.

Also, the summer 2007 monitoring inspection revealed that the majority of the tree and tree cages maintenance activities have been taken care of during the summer of 2007. In general the tree cages were in good shape. Overall, tree protectors on protective tree cages were well adjusted and lateral growth through tree cages had been correctly pruned. However, several trees were observed without protective tree cages between the Lyman to Elm Street Bridge monitoring area, potentially from cages being removed during tree pruning operations. It was recommended that the cages be installed on those trees. It was also noted that the tree cage maintenance was needed adjacent to monitoring plot 2-E-1.

In addition, supplemental vegetation monitoring work was performed to assess tree and shrub health and survivability within non-riverbank planting areas on residential, recreational and commercial properties within the 1.5-Mile Reach. The survivability requirement for the non-riverbank trees and shrubs was 100%. The following properties were inspected Parcel I8-24-1, Parcel I9-5-13, Parcel I6-1-66, Parcel I6-1-67, Parcel I6-1-68, Parcel I6-1-69, and Fred Garner Park (Parcel I7-1-101).

In general all trees and shrubs appeared healthy and to be growing vigorously. On Parcel I8-24-1 several invasive species were noted and need to be controlled. Virginia creeper (*Parthenocissus quinquefolia*) was observed to be climbing on one white pine and should be removed by hand from this tree. Hedge bindweed was observed to be growing on one balsam fir (*Abies balsamea*)

and should be removed by hand from this tree. Invasive species observed within the planting area include Japanese knotweed, black locust (*Robinia pseudoacacia*), and purple loosestrife. If invasive species are not controlled in this area by herbicide or regular mowing they will likely become prolific within a few years.

One white birch previously reported as "stressed" on Parcel I6-1-66 was observed to be dead. A second white birch previously reported as "stressed" continues to be stressed. Japanese knotweed was observed to be invading the planting area from the eastern side of the property. Three white birches were observed to be stressed on Parcel I6-1-67. Japanese knotweed was observed in various locations within this property.

All trees in upland planting areas at Fred Garner Park (Parcel I7-1-101) were apparently healthy. White pines previously reported in spring 2007 as "stressed" appeared to be fully recovered and healthy at the time of the survey.

The following actions are recommended and implemented during the fall of 2007:

Riverbank Planting Areas

- Install tree cages on the more established trees within Lyman to Elm Street reach.
- Re-seed and mulch plot 2-W-1 and adjacent areas.
- Restrict herbicide use to only Japanese knotweed, common reed, purple loosestrife, Norway maple, black locust, and invasive woody vines and shrubs.
- Restrict herbicide use within 3 feet of planted trees and shrubs.
- Restrict herbicide use under windy conditions.
- Continue hedge bindweed removal.
- Continue tree cage maintenance.
- Install tree protectors on cages on east bank of Pomeroy to Confluence reach.
- Control of purple loosestrife population between plots 2-W-2 and 2-W-3.
- Perform tree cage maintenance adjacent to plot 2-E-1.
- Replace 16 trees at STA 532+50 (east bank). Recommended species for replacement are box elder and eastern cottonwood.

Upland Planting Areas

- Remove by hand Virginia creeper from one white pine and hedge bind-weed from one balsam fir on Parcel I8-24-1 **(**Harry's Supermarket)
- Control invasive species observed within Parcel I8-24-1 **(**Harry's Supermarket) for Japanese knotweed, black locust, and purple loosestrife.
- Plant 1 Red Maple on Parcel I6-1-66 to replace the dead White Birch

An inspection of the aquatic habitat enhancement structures riverbed and riverbank riprap and riverbank soil in the 1½-Mile Reach was also performed during the summer monitoring visit, area along the entire 1 ½ mile were inspected (See inspection memo in Appendix D). The results of this monitoring suggest that that restoration features are stable and performing as designed.

Observed conditions adjacent to the aquatic habitat structures included variations in flow speed, including reversal of currents behind the structures. Scour of riverbed or riverbank riprap was not

observed adjacent to any of the observed structures. Sediment deposition was observed adjacent to some of the aquatic habitat structures, further indicating that the presence of the structures is providing diversity of aquatic habitat. The monitoring indicates that the performance standard was achieved.

The monitoring of the riverbed and riverbank riprap and riverbank soil revealed no significant displacement or damage, and in general suggested that the soil and riprap are in as-built condition. Any areas with minor riprap movement that had a potential of further movement of erosion were repaired in the fall of 2007.

Minimal exposure of sheetpile was observed along the east riverbank adjacent to the carwash facility on Parcel I8-23-6 and along the west bank adjacent to Parcel I7-21-3. The same exposure was also noted in previous inspections in 2006 and after the high flow event in April 2007. The observed sheetpile exposure was less than 6 inches in depth and the extent of the aforementioned area was less than approximately 10 feet in length. No action other than continued observation is recommended at this time.

Also, during the inspection it was noted that there seems to be a significant elevation difference between the downstream end of the articulated concrete block (ACB) and the adjacent riverbed immediately downstream of the terminus of the ACB. The variation in the elevations of the ACB and the riverbed riprap immediately downstream was further checked against the proposed design elevations, as-built drawings and post construction photos. It was determined that at this time the ACB and the adjacent riprap are in stable condition. No action other than continued observation is recommended at this time.

In addition, geotextile material was observed in a constructed riprap swale along the west riverbank between Elm and Dawes Avenue, adjacent to Parcel I8-4-6 suggesting possible movement of the riprap in the swale. Some erosion of riprap was observed under the left abutment of the Pomeroy Avenue Bridge immediately adjacent to a culvert that discharges through the bridge abutment wall. Additional riprap was placed in both areas of concern to mediate the possible erosion in the future.

A substantial area of algae was observed immediately adjacent to the inverted sewer siphon along the west riverbank. After further evaluation, it was observed that the algae was also present in other areas on the Housatonic River, such as the Upper ½ Mile reach and that the cause of the algae growth is likely be a natural occurrence.

Visual inspections were performed on ancillary items such as fencing, paved areas, and walls by Weston. The results of the observations indicate that the performance standard was archived. The ancillary items were noted to be in as-built condition, taking into account normal wear and tear.

5.2 APRIL 24, 2007 POST 1,500 CFS EVENT INSPECTION

Woodlot and Weston performed monitoring of aquatic habitat enhancement structures, riverbank soil, riprap, and riverbank vegetation on the 1.5-Mile Reach on April 24, 2007, in accordance with the post-1,500 cfs monitoring requirements set forth in Monitoring Plan. The monitoring

was performed in response to a hydrologic event on April 16 and 17, 2007, during which a peak flow of 1,670 cfs was recorded at 1:00 AM at the USGS stream gaging station.

The flow during the post-event monitoring work was approximately 360 cfs, as recorded at the USGS Coltsville gage. The monitoring was performed starting at the Lyman Street Bridge and ending at the confluence of the East and West Branches of the Housatonic River. The work was done by walking along the riverbank and looking for observable effects on the riverbed and riverbank from the high flow event. The magnitude of the April 16 and 17, 2007, flood event did not apparently result in overtopping of the installed riprap from Lyman Street Bridge to Pomeroy Avenue Bridge. Observations suggest that overtopping of the riverbanks may have occurred in areas downstream of the Pomeroy Avenue Bridge, immediately upstream from the confluence.

The results of this monitoring suggest that that restoration features are stable and performing as designed.

No areas of substantial erosion were observed during the monitoring work. Minor rill erosion was observed at the upper limit of the planted areas at one location along the west riverbank, adjacent to Parcel I9-4-19 and at a couple of locations along the east riverbank adjacent to the long term maintenance access road on Parcel I6-23-6. Those areas with minor soil erosion were repaired in 2007.

Also, minimal exposure of sheetpile was observed along the east riverbank adjacent to the carwash facility on Parcel I8-23-6. The same exposure was also noted in previous inspections in 2006. The extent of the aforementioned area was less than approximately 10 feet in length, and no remedial action other than continued observation is recommended at this time. Some exposure of Geoweb material was observed on the east slopes immediately upstream of the Elm Street Bridge. This may have resulted from settling of soil, as no indicators of recent erosion were observed, and no action other than continued observation is recommended at this time.

In addition, it was observed what may be exposed granular filter material along the west riverbank downstream of Elm Street Bridge at Station 529+25. Also, geotextile material was observed in a constructed riprap swale along the west riverbank adjacent to Deming Street and to the former temporary construction access road. Additional riprap was placed in both areas of concern to mediate the possible erosion in the future.

No indicators of disturbance to planted stock resulting from this event were observed. No deficiencies were observed in monitoring areas between Dawes Avenue Bridge and the Confluence.

The April 24, 2007 Post 1,500-CFS Hydrologic Event Inspection Memo prepared by Woodlot is included as Appendix E.

6.0 Post-Remediation sampling and Miscellaneous Maintenance and Repair Activities

6.1 POST-REMEDIATION SAMPLING

During 2007, EPA conducted two post-removal sampling programs. The first program was the Post-Remediation Sediment Sampling Program, which consisted of a collection of 95 post-remediation surficial sediment samples in June of 2007 along the entire 1½-Mile Reach. The second sampling program was the aquatic invertebrate and fish sampling program, which consisted of community characterization and polychlorinated biphenyls (PCB) tissue analysis of the benthic macroinvertabrates and collecting qualitative information on fish characterization and relative abundance in the reach. The reports documenting the results of these programs are as follows:

- *Post-Remediation Sediment Sampling Report*, August 2007
- *Post-Remediation Aquatic Community Assessment Report,* December 2007

6.2 MISCELLANEOUS MAINTENANCE AND REPAIR ACTIVITIES

Weston and Weston's various subcontractors performed numerous miscellaneous maintenance and repair activities throughout the year. Some of the maintenance and repair activities were a result of the spring and summer restoration inspections and the high flow even monitoring inspection. Other activities were a part of the 1½-Mile Reach close out tasks.

All of the actions recommended for implementation during the spring and summer vegetation inspections were performed in the summer and fall of 2007. These recommendations included re-planting, re-seeding, modified invasive species controls, tree maintenance and cage repair and maintenance. Details are listed in section 5.1.1 of this report for the spring recommendations and section 5.1.2 for the summer recommendations.

Winter clean up, maintenance and repairs were done at the Fred Garner Park. This included clean up of winter debris such as fallen tree branches and leaves, raking and preparation of the soccer field for an application of fertilizer. The fertilizer was than applied on the soccer field. Re-seeding by hand and hydro-seeding of several areas within the park was performed, including re-seeding of the 8-foot walking path to the confluence of the east and west branches of the Housatonic River. A removal one ash tree up-front of the park and several dead trees adjacent to the parking lot of the park was performed. In addition, regular moving and weed removal was performed at the Fred Garner Park including the soccer field and the 8-foot walking path until the park was turned over to the City of Pittsfield on June 2007.

The installation of a backflow prevention plugs on the two 15-inch pipes that drain the soccer field at Fred Garner Park was completed. The installation of the plugs was necessary to prevent river water from entering though the pipes and flood the soccer field during elevated river flows.

The re-location of a large river enhancement structure (boulder) directly downstream of the canoe access ramp at the Fred garner park was completed. The enhancement structure was

moved further downstream. The re-location of the enhancement structure was necessary as it was restricting some access to the river from the canoe access ramp.

All the minor soil and riprap erosion areas noted during the high flow inspection and the spring and summer inspections were repaired, this included, minor soil erosion at one location along the west riverbank, adjacent to Parcel I9-4-19 and at a couple of locations along the east riverbank adjacent to the long term maintenance access road on Parcel I6-23-6. Additional riprap was placed on the west riverbank downstream of Elm Street Bridge at Station 529+25. Also, additional riprap was placed in the riprap swale along the west riverbank adjacent to Deming Street and to the former temporary construction access road and under the left abutment of the Pomeroy Avenue Bridge immediately adjacent to a culvert that discharges through the bridge abutment wall.

7.0 Conclusions

The following conclusions are based on the 2007 restoration monitoring effort.

Aquatic Habitat Enhancement Structures - Observations made in April and August 2007 suggest that the installed habitat enhancement structures remain in as-built condition, are functioning as intended, and that the performance standard was achieved.

Riverbank Soil Restoration - The riverbank soil restoration performance standard was achieved in the restoration monitoring areas. Areas that sustained minor erosion during the course of the year were evaluated and repaired prior to the end of the year.

Riverbank Revegetation - The results of the spring 2007 restoration monitoring results indicated two areas that the applicable performance standards were not met due to two plots: 3-W-1 and 3-E-1. The performance standard was not met in those two plots due to the apparent loss of trees within the plots since the summer 2006 vegetation monitoring event. Both plots are located in residential areas and appear to be negatively affected by human activity. The supplemental planting was completed in the two areas represented by the plots in spring 2007. The current sample area/plots was modified and enlarged in order to better represent the entire residential area the plots are within. Since the spring 2007 additional planting and the re-adjustment of the monitoring plots the two monitoring areas met the performance standard.

Overall, in the summer 2007, all tree and shrub survivorship met or exceeded the 80 percent survivorship restoration performance standard. The installed trees and shrubs appeared healthy and growing vigorously. In addition, recruitment of "volunteer" native trees, particularly eastern cottonwood and box elder, was observed. Herbaceous vegetation cover ranged from 95 to 100 percent in most areas, and invasive plant cover was less than the maximum of 5 percent as defined by the applicable performance standard.

- **Supplemental Planting –** Supplemental planting of trees was performed in few riverbank and non-riverbank areas, as described in sections 5.1.1 and 5.1.2 of this report. All planting was completed in summer and fall 2007.

- **Tree Maintenance –** All recommended tree maintenance and tree cage maintenance was completed throughout the year. This included tree pruning, protective tree cage expansions and adjustment of interlocking tree guards/ties to allow for tree growth. Re-staking of tree cages that have fallen down and removal of cages from around dead trees.
- **Invasive Plant Control –** The performance standard was met in all monitoring areas. The invasive plant control work within the project area was performed throughout the year. A modified herbicide treatment regime was implemented in the fall 2007 to reduce impacts to desirable native species
- **Herbaceous Cover –** The performance standard was met in all areas with the exception of three monitoring plots (1-E-3, 2-W-1 and 4-W-2). Two out of the three plots exhibited stabilized soils and no action was recommended. Re-seeding and mulching monitoring plot 2-W-1 and adjacent area was performed in fall 2007.

Riverbed and Riverbank Riprap and ACB- The restoration performance standard for riverbank and riverbed riprap was achieved. Areas that sustained minor riprap movement during the course of the year were evaluated and repaired prior to the end of the year.

Ancillary Items - The ancillary items performance standard was achieved, as the ancillary items were found to be in as-built condition, while accounting for normal wear and tear.

8.0 References

Gleason, H.A. and A. Cronquist. 1991. Manual of Vascular Plants of Northeastern United States and Adjacent Canada. New York Botanical Garden. Bronx, NY.

Weatherbee, P., Somers, P., and Simmons, T. 1998. A Guide to Invasive Plants in Massachusetts, Prepared by The Massachusetts Biodiversity Initiative, Prepared for the Massachusetts Division of Fisheries and Wildlife.

Woodlot Alternatives, Inc. (Woodlot). 2004. 1½ Mile Reach Restoration Monitoring Plan, GE-Housatonic River Site, Pittsfield, MA. Prepared for Weston Solutions, Inc., 1 Wall Street, Manchester, NH 03101.

APPENDIX A

LIST OF INVASIVE PLANT SPECIES

Invasive Plant List

COMMON NAME	SCIENTIFIC NAME
Amur honeysuckle	*Lonicera maackii*
Autumn olive	*Elaeagnus umbellata*
Barnyard grass	*Echinochloa crusgalli*
Black locust	*Robinia pseudoacacia*
Black swallow-wort	*Cynanchum louiseae*
Bittersweet nightshade	*Solanum dulcamara*
Bushy Rock-cress	*Cardamine impatiens*
Canada bluegrass	*Poa compressa*
Chervil	*Anthriscus sylvestris*
Coltsfoot	*Tussilago farfara*
Common barberry	*Berberis vulgaris*
Common buckthorn	*Rhamnus cathartica*
Common / hedge privet	*Ligustrum vulgare*
Common mullein	*Verbascum thapsus*
Creeping buttercup	*Ranunculus repens*
Curly pondweed	*Potamogeton crispus*
Cypress spurge	*Euphorbia cyparissias*
Dame's rocket	*Hesperis matronalis*
Eurasian water-milfoil	*Myriophyllum spicatum*
Fanwort	*Cabomba caroliniana*
Garlic mustard	*Alliaria petiolata*
Giant waterweed	*Egeria densa*
Glossy buckthorn	*Rhamnus frangula*
Goutweed or	*Aegopodium podagria*
Hair fescue	*Festuca filiformis*
Hairy willow-herb	*Epilobium hirsutum*
Japanese barberry	*Berberis thunbergii*
Japanese honeysuckle	*Lonicera japonica*
Japanese hops	*Humulus japonicus*
Japanese knotweed	*Polygonum cuspidatum*
Japanese privet	*Ligustrum obtusifolium*
Japanese rose	*Rosa rugosa*
Kiwi vine	*Actinidia arguta*
Kudzu	*Pueraria montana*
Lesser naiad	*Najas minor*
Live-forever or Orpine	*Sedum telephium*
Money wort	*Lysimachia nummularia*
Morrow's honeysuckle	*Lonicera morrowii*
Morrow's X Tatarian	*Lonicera xbella*
Multiflora rose	*Rosa mutiflora*
Norway maple	*Acer platanoides*
Oriental bittersweet	*Celastrus orbiculata*

Phragmites, Reed grass	*Phragmites australis*
Porcelain berry	*Ampelopsis brevipedunculata*
Purple loosestrife	*Lythrum salicaria*
Reed canary-grass	*Phalaris arundinacea*
Russian olive	*Elaeagnus angustifolia*
Sea- or horned poppy	*Glaucium flavum*
Sheep fescue	*Festuca ovina*
Sheep-sorrel	*Rumex acetosella*
Silver lace-vine	*Polygonum aubertii*
Silver poplar	*Populus alba*
Spotted knapweed	*Centaurea biebersteinii*
Sweet reedgrass	*Glyceria maxima*
Sycamore maple	*Acer pseudoplatanus*
Tartarian honeysuckle	*Lonicera tartarica*
Tree-of-heaven	*Ailanthus altissima*
True forget-me-not	*Myosotis scorpioides*
Water-chestnut	*Trapa natans*
Watercress	*Rorippa nasturtium-aquaticum*
Wetsern catalpa	*Catalpa speciosa*
White mulberry	*Morus alba*
Wild thyme	*Thymus pulegioides*
Winged euonymus	*Euonymus alata*
Variable water-milfoil	*Myriophyllum heterophyllum*
Yellow floating heart	*Nymphoides peltata*
Yellow iris	*Iris pseudacorus*

Reference:

Weatherbee, P.B., P. Somers, T. Simmons. 1998. A Guide to Invasive Plants in Massachusetts. The Massachusetts Biodiversity Initiative. MassWildlife.

APPENDIX B

SPRING 2007 VEGETATION MONITORING REPORT

WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS

Memorandum

To: Joel Lindsay, Weston Solutions, Inc.

From: Todd Chadwell, Woodlot Alternatives

Cc: Izabela Zapisek, Weston Solutions, Inc.

Date: May 31, 2007

Re: 2007 Spring Vegetation Monitoring Report

On May 14 and May 15, 2007, Woodlot Alternatives, Inc. (Woodlot) established additional permanent monitoring plots in Monitoring Area 4 (South of Pomeroy Avenue Bridge) and conducted annual springtime vegetation monitoring and a meander survey in restored areas of the 1½-Mile Reach—GE Pittsfield/Housatonic River Site.

1.0 METHODS

1.1 Plot Establishment

Using base maps provided by Weston Solutions, Inc. (Weston), Woodlot calculated the surface area of revegetated locations within the final reach of the 1½-mile monitoring area. The final reach is located between the Pomeroy Avenue bridge and the confluence of the East and West Branches of the Housatonic River. Within the reach, surface area estimates were acquired for 10% of the normal revegetation area (700 trees/acre density) and 10% of the Geoweb ® cellular confinement area (500 trees/acre density). On the base map, Woodlot placed 3 plots on each bank of the river within the reach. Surface area of the combined plots in the reach was approximately equal to the desired 10% normal and 10% Geoweb ® monitoring criteria. Mapped plot locations were approved by Weston and the U.S. Environmental Protection Agency prior to establishment.

Woodlot located the plots in the field and first verified that these areas were representative of the entire planting area. The area of each monitoring plot was measured and two wooden stakes were driven into the ground at the top of bank at each edge of the plot. The upper limit of each plot was established approximately 8 inches above the highest adjacent plantings. The lower limit of each plot extended downslope to the upper limit of the riprap. If an established plot was adjacent to other plantings areas (i.e., power line right of ways, Fred Garner Park plantings, and GE floodplain plantings) the plot was established to encompass only a representative sample of NRD planting areas and not extend into adjacent planting areas. After establishing each plot, photos were taken to assist future location of the plots.

30 Park Drive Topsham, Maine 04086 Phone 207-729-1199 Fax 207-729-2715

1.2 Vegetation Monitoring

Vegetation monitoring work was performed by Woodlot in the three monitoring areas between the Lyman Street and Pomeroy Avenue bridges and in the new monitoring area between Pomeroy Avenue bridge and the Confluence. These monitoring areas are delimited by the four bridges crossing the 1½-Mile Reach (Lyman Street, Elm Street, Dawes Avenue, and Pomeroy Avenue, respectively, from upstream to downstream) and the confluence of the East and West Branches of the Housatonic River. The four monitoring areas represented by these five delimiters are numbered 1-4, respectively, moving downstream from the Lyman Street Bridge. In addition, each monitoring area is divided into sub-areas defined by the "east" (river-left [looking downstream]) and "west" (river-right) sides of the Housatonic River, with three subplots established on each side of the river within each monitoring area. A total of 24 permanent monitoring plots were evaluated as part of this work.

The 24 permanent monitoring plots were located and marked in the field. If the plot marker stakes could not be located, Woodlot re-established the plot based on construction plans used for plot-establishment in Spring 2006. Trees and shrubs within each plot were tallied by species and noted as "healthy" or "dead." "Dead" trees and shrubs were those that exhibited no foliage and the inner cambium was dead throughout the entire above ground portion of the plant. Volunteers of species that were planted were included in the tally if they were greater than twelve inches in height and appeared to be likely to survive. Volunteers of other tree and shrub species were recorded separately and not included in the tally.

Herbaceous cover and invasive plant cover percentages were not recorded, as this is not required during spring monitoring. However, notes were made on locations of invasive species populations when occurring within or near planting areas.

A meander survey was performed along both banks of each reach of the river to collect qualitative data on plant survivorship, observe invasive plant populations, and verify that plots were representative of surrounding areas.

2.0 RESULTS

The results of the monitoring plot inspection and meander surveys are summarized in this section. A discussion of the results and comparison to performance standards are provided in Section 3. Table 1 summarizes tree and shrub densities in each monitoring area. Table 2 summarizes tree and shrub densities in each monitoring plot.

2.1 Tree and Shrub Density/Survivorship

Table 1 provides a summary of the results of the Spring 2007 vegetation monitoring event for trees and shrubs, and includes the Summer 2006 results for comparison. Details of plot characteristics are presented in Table 2. The performance standard for trees and shrubs is 80 percent survivorship. In most monitoring areas, exact numbers of planted trees and shrubs were not available, so survivorship was estimated by comparing the current plant density to the expected plant density based on the design. In select areas where the plant count was known (i.e., plots 1-E-3, 3-W-2, 3-W-3, 3-E-3 and 4-E-2), the direct comparison of the current count to the original planted count was made.

Table 1. Comparison summary between Summer 2006 and Spring 2007 Monitoring Events

Monitoring Area	Performance Standard Summary					
	Summer 2006			Spring 2007		
	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm (West) (1-W)	85%	125%	NA	103%	152%	NA
Lyman-Elm (East) (1-E)	77%	103%	100%*	102%	137%	100%*
Elm-Dawes (West) (2-W)	102%	146%	287%	188%	140%	152%
Elm-Dawes (East) (2-E)	96%	124%	NA	91%	113%	NA
Dawes-Pomeroy (West) (3-W)	120%	100%*	90%	138%	100%*	60%
Dawes-Pomeroy (East) (3-E)	145%	88%	188%	137%	72%*	212%
Pomeroy-Confluence (West) (4-W)	NA	NA	NA	108%	115%	NA
Pomeroy-Confluence (East) (4-E)	NA	NA	NA	215%	119%*	152%

* Indicates percent survivorship as compared to the number of actual trees and shrubs planted. Applies to one plot or two plots out of the three plots within a monitoring area.
Note: Shaded areas do not meet the Performance Standard

2.2 Meander Survey Results

Lyman Street to Elm Street Reach

Trees in this reach suffered observable damage resulting from beaver herbivory, particularly along the upstream reach of this monitoring area. Tree stumps left by beavers are exhibiting extensive re-sprouting from the base. Many of the protective tree cages are too short to adequately protect trees from beaver herbivory in this location. Approximately 52 trees (all black willow [*Salix nigra*] and box elder [*Acer negundo*]) were impacted by beaver activity or are likely to be impacted by beavers in the future if the height of the protective tree cages is not increased. In general, tree guards on protective cages appeared to be adequately adjusted therefore not restricting tree growth. However, many trees have branches growing through protective tree cages (see photo 1). Such trees will allocate resources to this lateral growth that will eventually die-off from constriction. It is recommended that lateral branches growing through protective tree cages be properly pruned to promote vertical growth of the tree. Several box elders supplied for 2006 supplemental planting are shorter than the protective tree cages and are beginning to grow through the wire mesh. It is recommended that tree guards should be placed around these trees to reduce branching through the protective cages and adjusted as needed afterwards. Several protective cages were observed to be knocked over in the lower section of this reach. It is recommended that these tree cages be either re-staked if still protecting live trees or otherwise removed. High tree mortality was noted on the west bank approximately between STA 513+00 and STA 518+25. The cause of this mortality was not readily apparent. Supplemental planting is recommended in this area.

Minor erosion was noted at the top of bank behind the auto dealership on East Street (see photo 2). Erosion was also noted on the east bank across from the Silver Lake outfall and at STA 502+30. Forest tent caterpillars (*Malacosoma disstria*) were evident on one individual choke cherry shrub on the west bank within this reach. Damage caused by an unknown insect boring into woody growth of larger black willow trees was noted primarily on the east bank within this reach (see photo 3).

It was also observed that grapevine growth adjacent to the parking lot of Harry's Supermarket is encroaching upon planted trees. It is recommended that grapevine be removed from planting areas until sufficient tree growth has occurred. Hedge bindweed (*Calystegia sepium*) was beginning to emerge in sections of this reach. This vine competes with planted trees and shrubs for light. It is recommended that hedge bindweed be removed by hand from planted trees and shrubs to assist the establishment of these species.

Japanese knotweed (*Polygonum cuspidatum*) was observed infrequently on east and west banks of this reach. Other invasive species noted include Norway maple (*Acer platanoides*) and multiflora rose (*Rosa multiflora*).

Elm Street to Dawes Avenue Reach

The emergence of Hedge bindweed was observed in this reach. This vine has previously been a problem within this area, particularly below Elm Street along the west bank. It is recommended that hedge bindweed be removed by hand from planted trees and shrubs to assist the establishment of these species.

Monitoring plot 2-W-3 was reassessed to verify plot dimensions. Dimensions of this plot were originally recorded as 66 feet by 18 feet. Actual plot dimensions are 66 feet by 14 feet.

Several tree cages were lying on the ground on both banks within this reach. It is recommended that these tree cages be either re-staked if still protecting live trees or otherwise removed. High shrub mortality was observed between Elm Street and monitoring plot 2-W-2. The cause of mortality appears to be a result of competition for resources with prolific herbaceous growth in this area. Supplemental plantings of trees only to replace dead shrubs are recommended between monitoring plots 2-W-1 and 2-W-2.

Dawes Avenue to Pomeroy Avenue Reach

Tree and shrub growth was generally healthy in this reach. It was noted that shrubs on the east bank north of the Pomeroy Avenue Bridge are still contained by protective cages. It is recommended that all protective cages be removed from shrubs to allow for proper growth of these plants.

Pomeroy Avenue to Confluence Reach

This reach was planted in 2006 and is demonstrating healthy tree and shrub growth. Shrubs on the east bank within the "GE planting area" are contained within protective cages. In addition to adversely affecting the shrub's growth, shrub cages are likely to be removed by currents and floating debris in this flood-prone area. It is recommended that all protective cages be removed from shrubs. Trees in this location area lacking tree protectors and evidence of damage caused by trees rubbing on tree cages is apparent. Tree protectors should be installed as soon as possible. Bark mulch was utilized instead of fiber mulch mats on trees and shrubs within the "GE planting area". Much of the bark mulch was removed by recent flood conditions. As a result of the current lack of mulch, excessive competition from herbaceous growth as well as water stress under extreme drought conditions is possible. Finally, it was noted that single cable ties were used to attach the tree cages to the wooden stakes in this area. In other bank planting areas two cable ties were used to attach cages to wooden stakes in addition to wire staples anchoring tree cages to the ground. Tree cages that are not firmly affixed to wooden stakes or anchored to the ground will potentially shift in wind/flood conditions, causing harm to trees from the tree cages themselves or by allowing herbivore entry from below.

2.3 Upland Planting Counts

Woodlot also performed inspections of various upland planting locations as requested by Weston to assess total tree numbers as well as tree survival. Below the results of these upland plant counts are summarized. Recommendations relative to upland planting areas are included in Section 4.

Maffucio Property

- 74 live arborvitae, all with moderate level of chlorosis but generally healthy

Harry's Supermarket

- 1 dead balsam fir, all other trees living and apparently healthy

South of Pomeroy Avenue - East Bank (Property 16-1-69)

- 5 live hemlocks, all apparently healthy

South of Pomeroy Avenue - East Bank (Property 16-1-68)

- 15 live hemlocks, all apparently healthy
- 1 dead hemlock
- 14 spirea shrubs, 1 stressed and potentially requiring replacement

South of Pomeroy Avenue - East Bank (Property 16-1-67)

All upland trees and shrubs in this location were apparently healthy. The table below provides a count of all trees and shrubs in this location.

Upland Plants South of Pomeroy Avenue - East Bank (Property 16-1-67)

Trees	**Live**
Shadbush	3
Green Ash	2
White Birch	3
White Pine	7
Red Oak	2
Balsam Fir	2
Red Maple	2
Total	**21**
Shrubs	
Red Osier	2
American Cranberry	13
Silky Dogwood	2
Winterberry Holly	4
Chokecherry	4
Northern Arrow-wood	19
Total	**44**

South of Pomeroy Avenue - East Bank (Property 16-1-66)

A total of 45 living trees and 38 living shrubs were recorded at this location. One red maple and two white birches were included in the living category but noted to be experiencing stress resulting in some dead limbs. The table below provides a count of all trees and shrubs in this location.

Upland Plantings South of Pomeroy Avenue - East Bank (Property 16-1-66)

Trees	**Live**	**Dead**	**Stressed**
Shadbush	6	0	0
Green Ash	6	0	0
White Birch	6	2	2
White Pine	8	0	0
Red Oak	7	0	0
Balsam Fir	4	2	
Red Maple	8	0	1
Total	**45**	**4**	**3**
Shrubs			
Shadbush	1	0	0
American Cranberry	8	0	0
Silky Dogwood	6	0	0
Winterberry Holly	5	0	0
Chokecherry	5	0	0
Northern Arrow-wood	13	0	0
Total	**38**	**0**	**0**

Fred Garner Park

Inspection of large trees at Fred Garner Park revealed 4 dead red oak trees (tagged as "*Quercus borealis*" by tree nursery). One hemlock tree was noted to have 2 main stems, of which one is dead. While the majority of white pines planted in 2006 appeared to be healthy, a form of mealy bug was noted on most of these pines. Mealy bug was also observed on native white pines in the area. Two white pines were moderately stressed with general needle drop observed on one of these. At the time of inspection, new growth was observed on stressed white pines and it is likely that these pines will survive. One sugar maple was also observed to be moderately stressed but will likely survive. Trees recommended for replacement (5 red oaks) were marked with orange flagging. Trees experiencing stress but likely to survive were flagged with pink flagging.

3.0 DISCUSSION

Overall, healthy growth of planted species along with significant contribution from volunteers was observed during the monitoring work. Applicable performance standards for survivability of trees and shrubs were met in all monitoring areas except for two; 3-E and 3-W. The paragraphs below provide more detailed description of how tree and shrub densities were determined, and specific discussion of monitoring areas where tree densities were observed to be below the 80% performance standard. See Table 1 for the summary of tree and shrub densities and counts within monitoring areas. Additional

discussion is also provided below concerning specific areas of tree or shrub mortality noted in the meander survey.

Calculations of tree and shrub densities were based on the presence or absence of shrub clumps. If shrubs were evenly distributed within the monitoring area, shrub density should have been 730 shrubs/acre and tree density should be 700 trees/acre in normal plots or 500 trees/acre in areas with Geoweb ®. If a defined shrub clump was observed, the area of the shrub clump was delineated and resulting shrub density within the clump should have been 2,723 shrubs/acre if shrubs were planted 4 feet on center. The density of 2,723 shrubs per acre was established by utilizing the shrub clump planting design of shrubs installed 4-foot on center. One shrub occupies 16 square feet. 43,560 feet (1 acre) divided by 16 square feet results in a target density of 2,722.5 shrubs per acre within shrub clumps. Table 2 summarizes tree and shrub densities within monitoring plots.

Several areas within 1.5 Mile Reach, the planting schemes did not follow the standard planting densities due to needs or requests of residential property owners or the physical conditions of the riverbanks. If a monitoring plot was located within the areas that the standard planting densities were not followed, the assessment of the plot was based on the original number of plants planted. Such plots included 1-E-3, 3-W-2, 3-W-3, 3-E-3 and 4-E-2.

Tree density in the Geoweb ® section of the Dawes to Pomeroy West Monitoring Area (3-W) was below the 80% performance standard. This is due to the apparent loss of 2 box elder trees within Monitoring Plot 3-W-1 since the summer 2006 vegetation monitoring event. Tree density was below the 80% performance standard for the non- Geoweb ® section of the Dawes to Pomeroy East Monitoring Area (3-E) because 4 fewer trees were recorded in Monitoring Plot 3-E-1 this year. Both 3-W-1 and 3-E-1 are located in residential areas and appear to be negatively affected by human activity. A large compost pile has been created within Monitoring Plot 3-E-1 and a large Norway maple shades much of this plot. Trees and shrubs were tallied in all areas adjacent to these plots, including the trees and shrubs within the plots, and the information was used to assess tree densities within a greater section of this reach and to determine the necessity for supplemental planting. On the west riverbank all plants were counted on Parcels I7-2-46, I7-2-45 and I7-2-44, and on the east riverbank all plants were counted on Parcels I7-3-12 and I7-3-11. Based on the additional information gathered it was recommended that supplemental plantings of 1 box elder and 3 eastern cottonwoods be performed on the east riverbank and supplemental planting of 4 box elders and 2 silver maples *(Acer saccharinum)* on the west riverbank. High shrub density inhibits the ability to plant increased numbers of additional trees.

It was also recommended that the current sample area/plots be modified and enlarged in order to better represent the entire residential area the plots are within. Plot 3-W-1 will be approximately 1,037 square feet and Plot 3-E-1 will be approximately 1,233 square feet. Therefore, the assessment in the future will be based on a larger area with target densities based on the current live number of plants plus the recommended additional trees planted in the Spring 2007. This will be reflected in the Summer 2007 Inspection to be conducted in August 2007.

During the meander survey some areas of apparent increased tree and/or shrub mortality were observed within the west bank of the Lyman Street to Elm Street reach and the west bank of the Elm Street to Dawes Avenue reach. The cause of mortality on the Lyman Street to Elm Street reach was not readily apparent. Mortality in the Elm Street to Dawes Avenue reach was most probably caused by competition for resources with herbaceous species as well as previous herbivory by the forest tent caterpillars. Living shrubs in this area were typically greater than 4 feet in height (above the existing herbaceous layer). A large section of this reach was previously covered with hedge bind-weed in 2005 and 2006. It should also

be noted that trees and shrubs in the area were heavily infested with forest tent caterpillars in 2006 and most of the infested trees and shrubs were completely denuded of foliage last spring. Tree and shrub mortality was likely a combination of factors including herbivory by the forest tent caterpillar and competition for light and water from herbaceous growth (especially hedge bind-weed). In both of the areas that experienced high rates of tree and shrub mortality, dead trees and shrubs should be replaced with eastern cottonwood (*Populus deltoides*) and box elder trees. These replacement species are recommended because of their rapid growth rates and tolerance for drier conditions. In addition, in comparison to summer 2006, a significant decrease of trees was observed in plot 2-W-3. The overall % target density was achieved; however further research was performed to determine the reason for the decrease. Further review of the data sheets and field notes revealed that the increased numbers of trees present in the summer of 2006 was due to a very high number of volunteer trees observed at the time. It was determined that no additional actions were necessary to address this area.

4.0 RECOMMENDATIONS

The following actions are recommended for implementation during the Summer of 2007:

Riverbank Planting Areas

- Continue invasive plant control work, including addressing the presence of Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), Norway maple (*Acer platanoides*), garlic mustard (*Alliaria petiolata*), and common reed (*Phragmites australis*). Also it is recommended that false hedge bindweed be periodically removed from tree cages. In addition, perform grapevine removal from the area adjacent to the parking lot of Harry's Supermarket that is encroaching upon planted trees.
- Perform supplemental plantings of trees in areas that have experienced high tree and shrub mortalities on west banks of Monitoring Area 1 (24 trees) and Monitoring Area 2 (57 trees). Recommended species for replacement are box elder and eastern cottonwood.
- Perform supplemental plantings of box elder, eastern cottonwood, and silver maple (52 trees) on west bank of Monitoring area 1 to replace trees that have been impacted or are likely to become impacted by beavers as a result of installation of short protective cages.
- Perform supplemental plantings of 1 box elder and 3 eastern cottonwood on Parcel I7-3-12; 1 box elder on Parcel I7-2-46; 1 box elder and 1 silver maple on Parcel I7-2-45; and 2 box elders and 1 silver maple on Parcel I7-2-44.
- Remove protective cages from all shrubs as soon as possible.
- Perform pruning of tree branches growing through protective cages as soon as possible.
- Place tree guards around box elders that are shorter than tree cages.

Upland Planting Areas

- Prune dead main stem on Hemlock in Fred Garner Park (Parcel 7-1-101)
- Plant 4 Red Oaks as replacements in Fred Garner Park (Parcel 7-1-101)
- Plant 2 Red Oaks and 2 Red Maples on Parcel I6-1-66 to replace the 2 dead White Birch and 2 dead Balsam Fir
- Plant 2 Dark American Arborvitaes on Parcel I9-5-13
- Plant 1 Red Maple on Parcel I8-24-1 to replace the dead Balsam Fir
- Plant 1 Hemlock On Parcel I6-1-68

Photo 1. Silver maple requiring pruning due to lateral branching through protective cage.

Photo 2. Erosion under erosion control mat on west bank south of Lyman Street.

Photo 3. Wounds in black willow caused by insect boring into woody growth.

Woodlot Alternatives, Inc. **WAI PN.: 104141**
WAI PN 104141.03, Spring 2007 Vegetation Monitoring, **Date: 15-May-07**
1.5 Mile Reach, Housatonic River, Pittsfield, MA **By: TBC**
Monitoring Performed by Todd Chadwell, Woodlot Alternatives, Inc. **Checked By:**

					Dimensions					Trees						Shrubs							Total Plants
Reach	Bank	Plot No.	Type	Date	L (ft)	Slope W (ft)	Height (ft)[1]	W (ft)	Area (ft^2)	BW	SM	EC	BE	Total Trees	Tree Density (Regular)	ROD	SD	WH	CC	NA	Total Shrubs	Shrub Density	Total Plants
Lyman-Elm	West	1-W-1	Regular	5/15/2007	61	10	3	9.5	582	3	4	5	5	17	1273	0	0	0	0	0	0	0	17
Lyman-Elm	West	1-W-2	Regular	5/15/2007	32	31	4.5	30.7	981	5	12	6	6	29	1287	2	0	0	0	1	3	133	32
Lyman-Elm	West	1-W-3	Regular	5/15/2007	67	22	5	21.4	1435	5	3	8	5	21	637	9	4	5	4	4	26	789	47
Monitoring Area Average																							
Lyman-Elm	East	*1-E-1*	Regular	5/15/2007	139	12	2	11.8	1645	8	5	8	7	28	742	15	11	9	6	4	45	1192	73
Lyman-Elm	East	*1-E-2*	Regular	5/15/2007	45	34.5	2	34.4	1550	9	8	13	12	42	1180	0	2	0	0	0	2	56	44
Lyman-Elm	East	*1-E-3*	Geoweb	5/15/2007	70	22	13	17.7	1242	0	0	0	6	6	210	12	5	0	5	0	22	771	28
Monitoring Area Average																							
Elm-Dawes	West	*2-W-1*	Regular	5/15/2007	63	18	6.5	16.8	1057	7	6	6	2	21	865	9	1	0	0	1	11	453	32
Elm-Dawes	West	*2-W-2*	Regular	5/15/2007	17	57	19	53.7	914	6	1	8	8	23	1097	1	0	0	0	0	1	48	24
Elm-Dawes	West	*2-W-3*	Geoweb	5/15/2007	66	14	11	8.7	572	0	1	1	8	10	762	0	10	0	5	3	18	1372	28
Monitoring Area Average																							
Elm-Dawes	East	*2-E-1*	Regular	5/15/2007	33	31	15	27.1	895	2	0	7	3	12	584	7	7	6	2	3	25	1216	37
Elm-Dawes	East	*2-E-2*	Regular	5/15/2007	27	35	9	33.8	913	3	3	8	3	17	811	6	0	0	0	0	6	286	23
Elm-Dawes	East	*2-E-3*	Regular	5/15/2007	141	11	5	9.8	1382	5	7	12	7	31	977	0	16	0	0	1	17	536	48
Monitoring Area Average																							
Dawes-Pomeroy	West	*3-W-1*	Geoweb	5/15/2007	65	9	1	8.9	581	1	2	1	0	4	300	0	11	3	3	1	18	1349	22
Dawes-Pomeroy	West	*3-W-2*	Regular	5/15/2007	67	14	0	14.0	938	3	3	1	2	9	418	9	2	2	0	3	16	743	25
Dawes-Pomeroy	West	*3-W-3*	Regular	5/15/2007	105	13	0	13.0	1365	6	4	1	1	12	383	15	0	6	6	2	29	925	41
Monitoring Area Average																							
Dawes-Pomeroy	East	*3-E-1*	Regular	5/15/2007	78	10	4	9.2	715	1	3	0	1	5	305	0	10	2	3	2	17	1036	22
Dawes-Pomeroy	East	*3-E-2*	Geoweb	5/15/2007	38	12	7	9.7	370	1	0	7	1	9	1058	5	0	0	1	0	6	706	15
Dawes-Pomeroy	East	*3-E-3*	Regular	5/15/2007	77	10	0	10.0	770	7	3	2	0	12	679	11	0	2	3	3	19	1075	31
Monitoring Area Average																							
Pomeroy-Confluence	West	*4-W-1*	Regular	5/15/2007	50	18	0	18.0	900	5	5	3	6	19	920	6	0	0	0	0	6	290	25
Pomeroy-Confluence	West	*4-W-2*	Regular	5/15/2007	50	25	0	25.0	1250	1	4	11	6	22	767	6	0	0	0	0	6	209	28
Pomeroy-Confluence	West	*4-W-3*	Regular	5/15/2007	74	12	0	12.0	888	3	2	7	3	15	736	10	5	6	6	4	31	1521	46
Monitoring Area Average																							
Pomeroy-Confluence	East	*4-E-1*	Geoweb	5/15/2007	50	8	0	8.0	400	2	2	2	1	7	762	6	0	0	0	0	6	653	13
Pomeroy-Confluence	East	*4-E-2*	Regular	5/15/2007	50	10	0	10.0	500	2	0	1	0	3	261	0	7	5	1	3	16	1394	19
Pomeroy-Confluence	East	*4-E-3*	Regular	5/15/2007	50	10	0	10.0	500	3	5	3	0	11	958	0	6	2	6	6	20	1742	31
Monitoring Area Average																							

Notes:

1: **From As-Built CAD Drawing**
2: **3-W-1 Height based on field observation**
3: **3-E-1 Height based on field observation**

Species Legend
BW = black willow
SM = silver maple
EC = eastern cottonwood
BE = box elder
SD = silky dogwood
ROD = red-osier dogwood
NA= northern arrow-wood
WH = winterberry holly
CC = chokecherry

Woodlot Alternatives, Inc.
WAI PN 104141.03, Spring 2007 Vegetation
1.5 Mile Reach, Housatonic River, Pittsfield
Monitoring Performed by Todd Chadwell, Woodlot Alterr

					Shrub Clumps							Trees				Performance Standard Summary		
Reach	**Bank**	**Plot No.**	**Type**	**Plot Characterization**	Length	Width	Shrub No.	Area*	Shrub D (shrubs/acre)	Target D (shrubs/acre)	% Target D	Area	Tree Density (tree/acre)	Target D (tree/acre)	% Target D or % Survivability	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm	West	1-W-1	Regular	no shrubs clumps or RO band, shrub clump immediately upstream								582	1273	700	182%			
Lyman-Elm	West	1-W-2	Regular	4 shrubs projecting in from clump upstream, RO band incomplete								981	1287	700	184%			
Lyman-Elm	West	1-W-3	Regular	shrub clump approx. 24x14ft at S edge of plot	24	14	17	264	2806	2723	103%	1435	637	700	91%			
Monitoring Area Average												Monitoring Area Average				103%	152%	NA
Lyman-Elm	East	*1-E-1*	Regular	shrub clump approx. 77x8ft in center of plot, RO band 77 ft in length	77	8	30	484	2701	2723	99%	1645	742	700	106%			
Lyman-Elm	East	*1-E-2*	Regular	shrub clump immediately upstream								1550	1180	700	169%			
Lyman-Elm	East	*1-E-3*	Geoweb	all shrubs with interspersed trees, shrubs 4-10ft OC, avg 7 ft OC				1242	771	730	106%	1242	210	NA	100%			
Monitoring Area Average												Monitoring Area Average				102%	137%	100%
Elm-Dawes	West	*2-W-1*	Regular	2 shrubs projecting in from clump upstream								1057	865	700	124%			
Elm-Dawes	West	*2-W-2*	Regular	RO band unevenly spaced, shrub clump immed. upstream								914	1097	700	157%			
Elm-Dawes	West	*2-W-3*	Geoweb	shrubs distributed evenly with trees				572	1372	730	188%	572	762	500	152%			
Monitoring Area Average												Monitoring Area Average				188%	140%	152%
Elm-Dawes	East	*2-E-1*	Regular	shrub clump approx. 1/2 of plot extending upstream (triangle)			18	316	2484	2723	91%	895	584	700	83%			
Elm-Dawes	East	*2-E-2*	Regular	no shrub clumps, shrub clump approx. 200 ft upstream & downstream								913	811	700	116%			
Elm-Dawes	East	*2-E-3*	Regular	no shrub clumps, shrub clump approx. 300 ft upstream								1382	977	700	140%			
Monitoring Area Average												Monitoring Area Average				91%	113%	NA
Dawes-Pomeroy	West	*3-W-1*	Geoweb	all shrub clump w/ trees interspersed, some area void of plantings				581	1349	730	185%	581	300	500^	60%			
Dawes-Pomeroy	West	*3-W-2*	Regular	shrubs distributed evenly with trees, GE planting adjacent				938	743	730	102%	938	418	NA	100%			
Dawes-Pomeroy	West	*3-W-3*	Regular	shrubs distributed evenly, some area void, GE planting adjacent				1365	925	730	127%	1365	383	NA	100%			
Monitoring Area Average												Monitoring Area Average				138%	100%	60%
Dawes-Pomeroy	East	*3-E-1*	Regular	shrub clump approx. 16x6ft w/ some interspersed shrubs	16	6	6	75	3466	2723	127%	715	305	700^	44%			
Dawes-Pomeroy	East	*3-E-2*	Geoweb	no shrub clumps, shrub clump approx. 120 ft downstream								370	1058	500	212%			
Dawes-Pomeroy	East	*3-E-3*	Regular	shrubs distributed evenly with trees, GE planting adjacent				770	1075	730	147%	770	679	NA	100%			
Monitoring Area Average												Monitoring Area Average				137%	72%	212%
Pomeroy-Confluence	West	*4-W-1*	Regular	Shrubs in adjacent WMECO ROW								900	920	700	131%			
Pomeroy-Confluence	West	*4-W-2*	Regular	Shrubs in adjacent WMECO ROW								1250	767	700	110%			
Pomeroy-Confluence	West	*4-W-3*	Regular	Shrub clump approximately 1/2 of plot	40	10	27	400	2940	2723	108%	888	736	700	105%			
Monitoring Area Average												Monitoring Area Average				108%	115%	NA
Pomeroy-Confluence	East	*4-E-1*	Geoweb	Shrub clump adjacent to plot								400	762	500	152%			
Pomeroy-Confluence	East	*4-E-2*	Regular	shrubs distributed evenly with trees, predominantly all shrubs				500	1394	730	191%	500	261	NA	100%			
Pomeroy-Confluence	East	*4-E-3*	Regular	shrubs distributed evenly with trees				500	1742	730	239%	500	958	700	137%			
Monitoring Area Average												Monitoring Area Average				215%	118%	152%

Notes:

Target Planting Densities	Normal	Geoweb	
Trees:	700	500	per acre
Shrubs:	730	730	per acre
Total:	1430	1230	per acre

* area of ellipse or triangle for shrub clumps
shrub clump
denotes plots where survivorship criterion is based on actual number of trees planted.

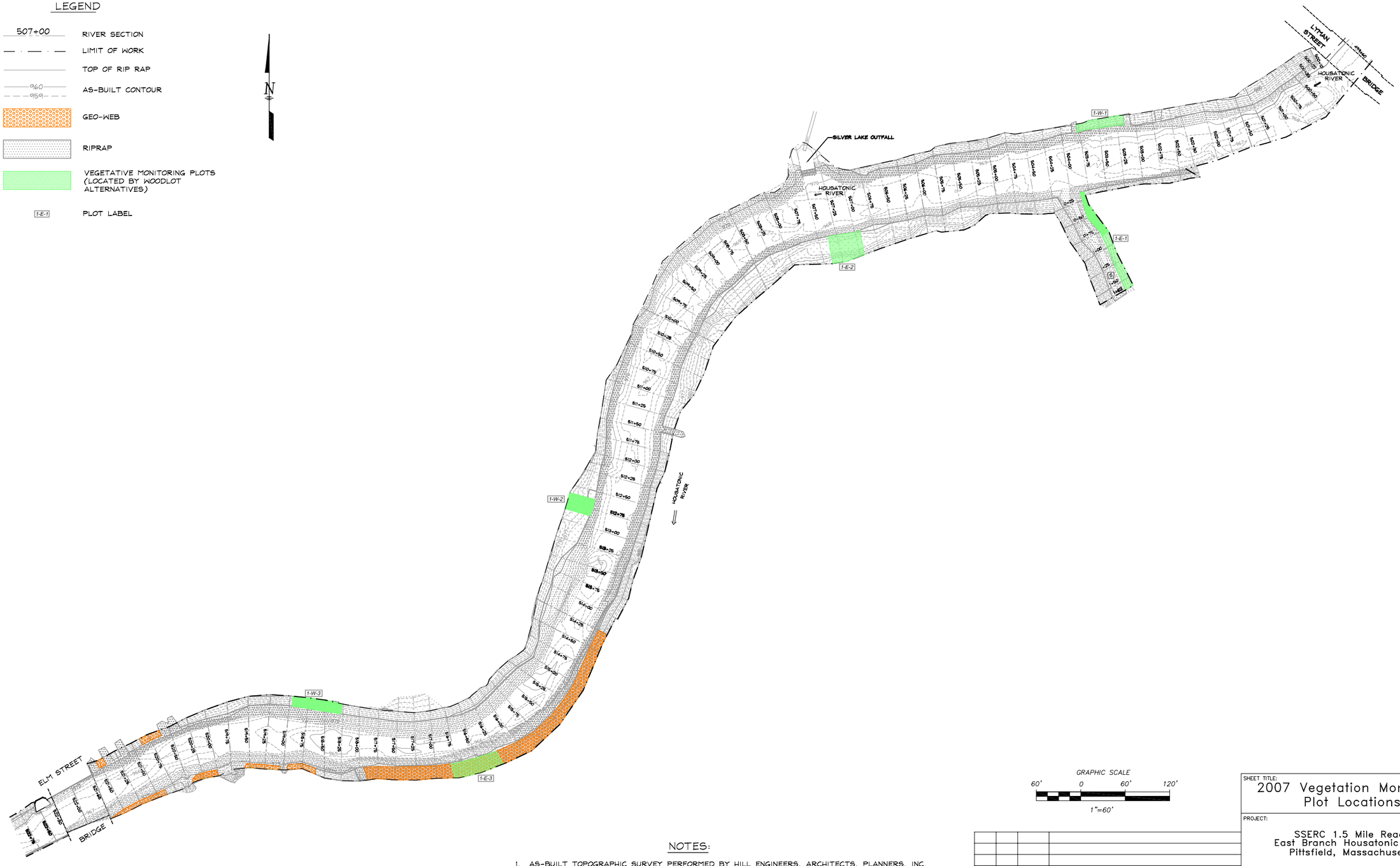
Assessment of sample area (plot) based on original number of trees planted
Plot #: *(1-E-3)* - Six trees originally planted within plot, with 100% survivability to date
Plot #: *(3-W-2)* - Nine trees originally planted within plot, with 100% survivability to date
Plot #: *(3-W-3)* - Twelve trees originally planted within plot, with 100% survivability to date
Plot #: *(3-E-3)* - Twelve trees originally planted within plot, with 100% survivability to date
Plot #: *(4-E-2)* - Three trees originally planted within plot, with 100% survivability to date

^ - Based on observations made during the 2007 Spring inspection, it was recommended that additional trees be planted within the entire residential area that these sample areas/plots represent. It was also recommended that the current sample area/plots be modified and enlarged in order to better represent the entire residential area the plots are within. Therefore, the assessment in the future will be based on a larger area, and the target density will be based on live number of plants plus the recommended additional trees planted in the Spring 2007. In the future target density for sample area/plot 3-W-1 will be 500 tree/acre and for 3-E-1 will be 388 tree/acre.

LEGEND

- 507+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL

N



GRAPHIC SCALE
60' 0 60' 120'
1"=60'

NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 1

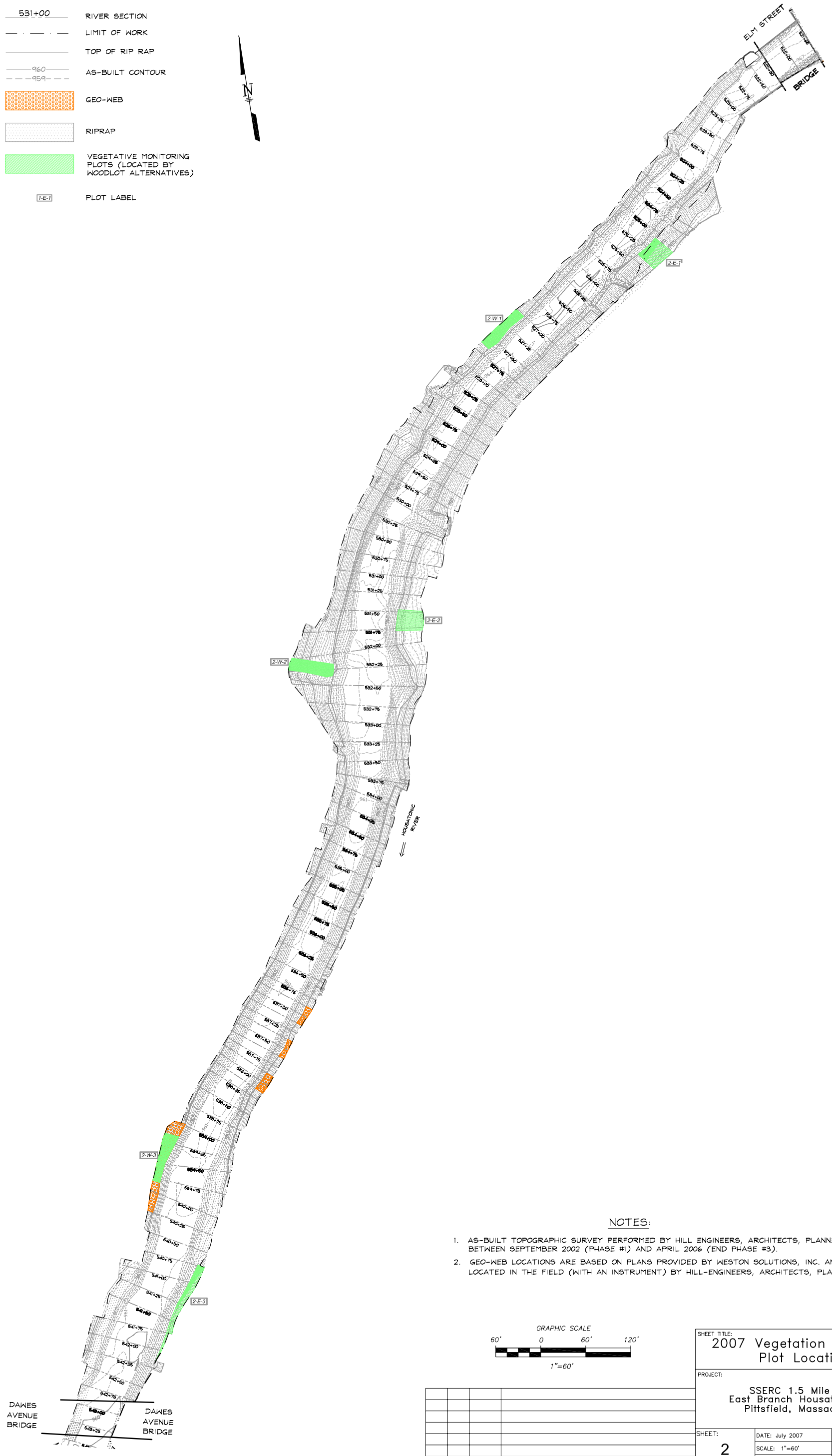
DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

S:\civil\CURRENT2000\SRK--758--57(GEOWEB)\dwg\104141-F105--2006 Monitoring Plots (WOODLOT DRAWINGS 8-7-07).dwg

LEGEND

- 531+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL



NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

GRAPHIC SCALE
60' 0 60' 120'
1"=60'

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 2

DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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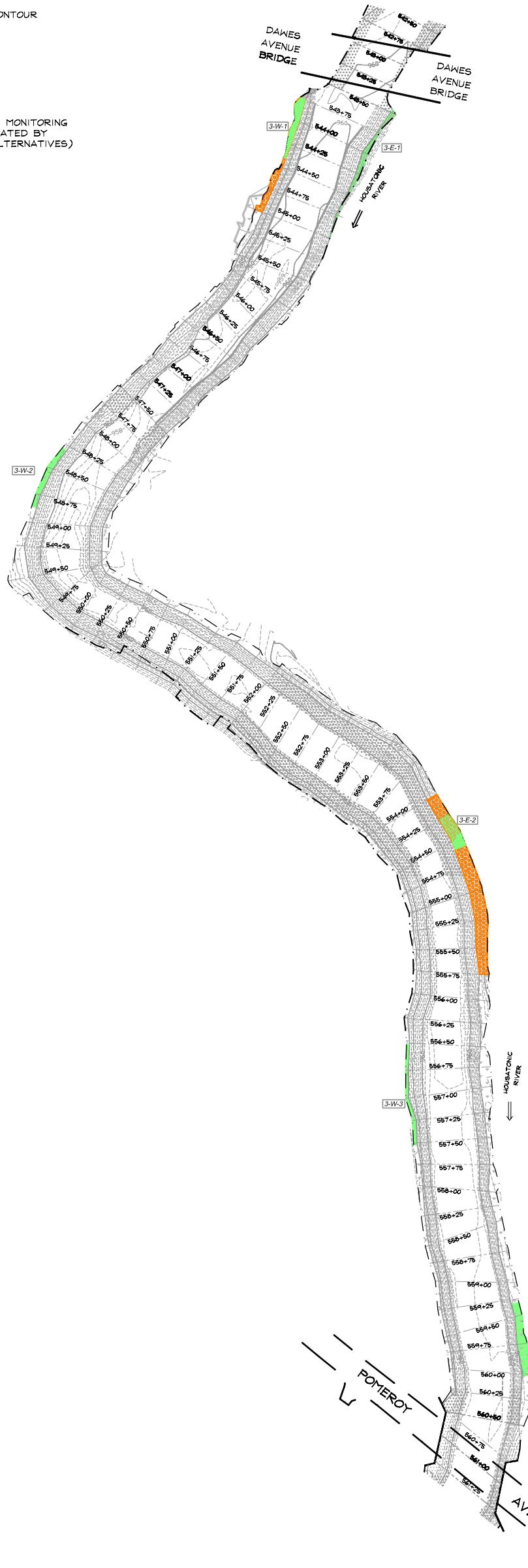
LEGEND

- 531+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL



GRAPHIC SCALE
60' 0 60' 120'
1"=60'

NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 3
DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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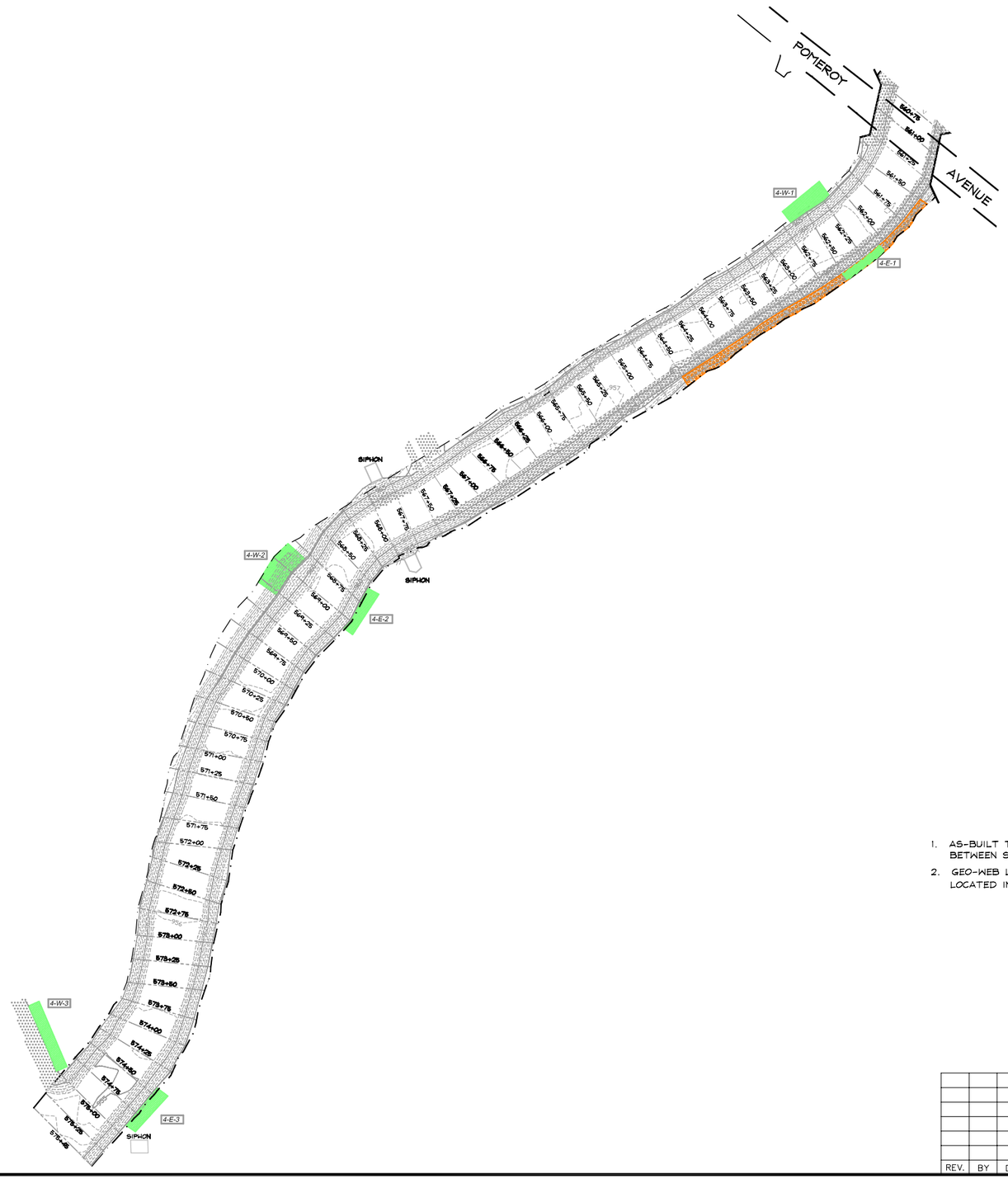
LEGEND

- 562+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 4-W-1 — PLOT LABEL



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NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 4

DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Ryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1-B-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	–	–
Silver Maple	IIII D: I	4	Silky Dogwood		–
Eastern Cottonwood	~~IIII~~	5	Winterberry Holly		–
Box Elder	~~IIII~~	5	Chokecherry		–
			Northern Arrowwood		

Total Live Trees: 17 **Total Live Shrubs:** 0

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 1W2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Lawson Date: 3/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1W-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	11	2
Silver Maple	𝍸 𝍸 11	12	Silky Dogwood		-
Eastern Cottonwood	𝍸 1	6	Winterberry Holly		-
Box Elder	𝍸 1	6	Chokecherry		-
			Northern Arrowwood	1	1

Total Live Trees: 29 **Total Live Shrubs:** 3

Herbaceous Cover (%): 95% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 1W3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1W-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	𝍸 𝍸	9
Silver Maple	𝍸	3	Silky Dogwood	𝍸	4
Eastern Cottonwood	𝍸 𝍸	8	Winterberry Holly	𝍸	5
Box Elder	𝍸	5	Chokecherry	𝍸	4
			Northern Arrowwood	𝍸	4

Total Live Trees: 21 **Total Live Shrubs:** 26

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1E1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): Bryan Lawson & Todd Chadwell Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1-E-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1111 1 11 1	8	Red osier Dogwood	5+ 5+ 4	15
Silver Maple	10 1111	5	Silky Dogwood	5+ 4 1	11
Eastern Cottonwood	5+ 111	8	Winterberry Holly	5+ 1111	9
Box Elder	5+ 11 (1)	7	Chokecherry	5+ 1	6
			Northern Arrowwood	1111	4

Brown

Total Live Trees: 28 **Total Live Shrubs:** 45

Herbaceous Cover (%): 95% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1E2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): Bryan Emerson & Todd Chadwell Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1-E-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	9	9	Red-osier Dogwood		-
Silver Maple	8	8	Silky Dogwood	11	2
Eastern Cottonwood	13	13	Winterberry Holly		-
Box Elder	12 (D:1)	12	Chokecherry		-
			Northern Arrowwood		-

Total Live Trees: 42 **Total Live Shrubs:** 2

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1E3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07

Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 1-E-3

Riverbank Length (ft): _____ Avg width (ft):_____

Planting Area (sf):_____ 10-20% Area (sf):_____

Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____

Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow			Red-osier Dogwood	𝍸 𝍸 11	12
Silver Maple			Silky Dogwood	𝍸	5
Eastern Cottonwood			Winterberry Holly		-
Box Elder	𝍸 1	6	Chokecherry	𝍸	5
			Northern Arrowwood		-

Total Live Trees: 6 **Total Live Shrubs:** 22

Herbaceous Cover (%): 95% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

- One Box Elder has a Willow sp growing in the same cage

Revegetation Monitoring Field Form 2 W 1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2-W-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸 II	7	Red-osier Dogwood	𝍸 IIII	9
Silver Maple	𝍸 I	6	Silky Dogwood	I	I
Eastern Cottonwood	𝍸 I	6	Winterberry Holly		
Box Elder	II D: III	2	Chokecherry		
			Northern Arrowwood	I	I

Total Live Trees: 21 **Total Live Shrubs:** 11

Herbaceous Cover (%): 80% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Cage maintenance needed

Revegetation Monitoring Field Form 2W2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): Bryan Ernesen Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2W2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	HHH. I	6	Red-osier Dogwood	I	1
Silver Maple	I	1	Silky Dogwood		
Eastern Cottonwood	HHH III	8	Winterberry Holly		
Box Elder	HHH III	8	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 23 **Total Live Shrubs:** 1

Herbaceous Cover (%): 100% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Willows are very stressed

Revegetation Monitoring Field Form 2W3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2-W-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 2W3 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow			Red-osier Dogwood		
Silver Maple	1	1	Silky Dogwood	5 5	10
Eastern Cottonwood	1	1	Winterberry Holly		
Box Elder	4 1	6	Chokecherry	4	5
			Northern Arrowwood	111	3

Total Live Trees: 8 **Total Live Shrubs:** 18

Herbaceous Cover (%): NA

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):
Lots of Box Elder seedlings (6"-1' tall) from large Box Elder @ above plot

Revegetation Monitoring Field Form 2E1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2-E-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 2E1 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	II	2	Red-osier Dogwood	IIII II	7
Silver Maple			Silky Dogwood	IIII II	7
Eastern Cottonwood	IIII II	7	Winterberry Holly	IIII I	6
Box Elder	III	3	Chokecherry	II	2
			Northern Arrowwood	III	3

Total Live Trees: 12 **Total Live Shrubs:** 25

Herbaceous Cover (%): 95% (WA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 2E2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2-E-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 2E2 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	HHI	6
Silver Maple	III	3	Silky Dogwood		
Eastern Cottonwood	HH III	8	Winterberry Holly		
Box Elder	III	3	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 17 **Total Live Shrubs:** 6

Herbaceous Cover (%): 100 (avg)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 2E3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 2E-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 2E3 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	IIII	5	Red-osier Dogwood		
Silver Maple	IIII II	7	Silky Dogwood	IIII IIII IIII I	16
Eastern Cottonwood	IIII IIII II	12	Winterberry Holly		
Box Elder	IIII II	7	Chokecherry		
			Northern Arrowwood	1	1

Total Live Trees: 31 **Total Live Shrubs:** 17

Herbaceous Cover (%): 95% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3W1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3W1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3W1 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood		
Silver Maple	11	2	Silky Dogwood	~~HHH HH~~ 1	11
Eastern Cottonwood	1	1	Winterberry Holly	111	3
Box Elder			Chokecherry	111	3
			Northern Arrowwood	1	1

Total Live Trees: 4 **Total Live Shrubs:** 18

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3W2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): Byron Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3-W-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3W2 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	~~HH~~ IIII	9
Silver Maple	III	3	Silky Dogwood	II	2
Eastern Cottonwood	I	1	Winterberry Holly	II	2
Box Elder	II	2	Chokecherry		
			Northern Arrowwood	III	3

08/14/07 = Serviceberry

Total Live Trees: 9 **Total Live Shrubs:** 16 (14)

Herbaceous Cover (%): 95% (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3W3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3W3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3W3 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸 I	6	Red-osier Dogwood	𝍸 𝍸 𝍸	15
Silver Maple	IIII	4	Silky Dogwood		
Eastern Cottonwood	I	1	Winterberry Holly	𝍸 I	6
Box Elder	I	1	Chokecherry	𝍸 I	6
			Northern Arrowwood	II	2

Total Live Trees: 12 **Total Live Shrubs:** 29

Herbaceous Cover (%): 90 (est)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3E1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Lewis Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3-E-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3E1 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood		
Silver Maple	III	3	Silky Dogwood	++++ ++++	10
Eastern Cottonwood			Winterberry Holly	II	2
Box Elder	1	1	Chokecherry	III	3
			Northern Arrowwood	II	2

Total Live Trees: 5 **Total Live Shrubs:** 17

Herbaceous Cover (%): 100 (est)

Invasive Plant Cover (%): n/a

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3E2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3E2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3E2 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	HHH	5
Silver Maple			Silky Dogwood		
Eastern Cottonwood	HHH II	7	Winterberry Holly		
Box Elder	1	1	Chokecherry	1 (in same cage as a cottonwood)	1
			Northern Arrowwood		

Total Live Trees: 9 **Total Live Shrubs:** 6

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 3E3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3E3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 3E3 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	11	7	Red-osier Dogwood	9	11
Silver Maple	111	3	Silky Dogwood		
Eastern Cottonwood	11	2	Winterberry Holly	11	2
Box Elder			Chokecherry	111	3
			Northern Arrowwood	111	3

Total Live Trees: 12 **Total Live Shrubs:** 19

Herbaceous Cover (%): 95 (avg)

Invasive Plant Cover (%): N/A

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4W1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4-W-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	𝍸 I	6
Silver Maple	𝍸	5	Silky Dogwood		
Eastern Cottonwood	III D: I	3	Winterberry Holly		
Box Elder	𝍸 I	6	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 19 **Total Live Shrubs:** 6

Herbaceous Cover (%): 100 (NA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4 W2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4-W-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 4 W 2 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	𝍸 1	6
Silver Maple	1111	4	Silky Dogwood		
Eastern Cottonwood	𝍸 𝍸 1	11	Winterberry Holly		
Box Elder	𝍸 1	6	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 22 **Total Live Shrubs:** 6

Herbaceous Cover (%): 75 NA

Invasive Plant Cover (%): (NA)

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4W3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): ~~Bryan Enwood~~ & TC Date: start 7/30/09
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4-W-3
Riverbank Length (ft): 24 Avg width (ft): 12
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:
plot expanded

Random Sample Location Number: 4W3 Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	X3	Red-osier Dogwood	~~HHH~~ ~~HH~~	X10
Silver Maple	II	X2	Silky Dogwood	~~HHH~~	5
Eastern Cottonwood	~~HH~~ II (1)	X7	Winterberry Holly	~~HHH~~ I	6
Box Elder	III	X3	Chokecherry	~~HHH~~ I	6
			Northern Arrowwood	IIII	4

Total Live Trees: X15 **Total Live Shrubs:** ~~27~~ 31

Herbaceous Cover (%): 90 (WA)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4E1

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4E1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 4E1 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	11	2	Red-osier Dogwood	1111 1	6
Silver Maple	11	2	Silky Dogwood		
Eastern Cottonwood	11	2	Winterberry Holly		
Box Elder	1	1	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 7 **Total Live Shrubs:** 6

Herbaceous Cover (%): 90 (min)

Invasive Plant Cover (%): NA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4E2

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4E2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 4E2 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	11	2	Red-osier Dogwood		
Silver Maple		-	Silky Dogwood	~~IIII~~ 11	7
Eastern Cottonwood	1	1	Winterberry Holly	~~IIII~~	5
Box Elder		-	Chokecherry	1	1
			Northern Arrowwood	III	3

Total Live Trees: 3 **Total Live Shrubs:** 16

Herbaceous Cover (%): 80 (WA)

Invasive Plant Cover (%): WA

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form 4E3

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): Bryan Emerson Date: 5/15/07
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 4-E-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number: 4E3 Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood		
Silver Maple	++++	5	Silky Dogwood	++++ I	6
Eastern Cottonwood	III	3	Winterberry Holly	II	2
Box Elder			Chokecherry	++++ I	6
			Northern Arrowwood	++++ I	6

Total Live Trees: 13 11 **Total Live Shrubs:** 20

Herbaceous Cover (%): 85

Invasive Plant Cover (%):_____

Meander Survey Comments (Use Additional Sheets As Necessary):

5 dead trees in plot, either Box Elder or Silver Maple

APPENDIX C

SUMMER 2007 VEGETATION MONITORING REPORT

Weston Solutions, Inc.
10 Lyman Street, Suite 2
Pittsfield, Massachusetts 01201
413-442-4224 • Fax 413-442-4447

November 2, 2007

U.S. Department of the Army
New England District, Corps of Engineers
10 Lyman Street
Pittsfield, MA 01201
Attn: Darrell Moore, Resident Engineer

Re: GE/Housatonic River Site
1.5 Mile Reach Removal Action
2007 Summer Vegetation Monitoring Report
DCN: GE-110107-ADRJ

Dear Mr. Moore:

Weston Solutions, Inc. (WESTON®) is enclosing the final report entitled *"2007 Summer Vegetation Monitoring Report"* This report presents and summarizes results for the 2007 Summer Vegetation Monitoring conducted in the 1.5 Mile Reach of the Housatonic River in Pittsfield, MA.

This submittal has undergone WESTON's technical and quality control review and coordination procedures to ensure: (1) completeness for each discipline commensurate with the level of effort required for the submittal; (2) elimination of conflicts, errors, and omissions; (3) compliance with project criteria; and (4) overall professional and technical accuracy of the submittal.

Please feel free to call me at (978) 779-8904 with any questions.

Very truly yours,

Weston Solutions, Inc.

Joel Lindsay, PE
Task Manager

Enclosures

cc: D. Tagliaferro, EPA
DCN Files

Memorandum

To: Joel Lindsay, Weston Solutions, Inc.

From: Todd Chadwell, Stantec Consulting (formerly Woodlot Alternatives, Inc.)

Cc: Izabela Zapisek, Weston Solutions, Inc.

Date: October 31, 2007

Re: 2007 Summer Vegetation Monitoring Report

On August 13, 14, and 15, 2007, Stantec Consulting (Stantec), formerly Woodlot Alternatives, Inc[1],. conducted annual summertime vegetation monitoring and a meander surveys in restored areas of the 1½-Mile Reach—GE Pittsfield/Housatonic River Site.

1.0 METHODS

1.1 Vegetation Monitoring

Vegetation monitoring work was performed by Stantec in the four monitoring areas between the Lyman Street Bridge and the Confluence. These monitoring areas are delimited by the four bridges crossing the 1½-Mile Reach (Lyman Street, Elm Street, Dawes Avenue, and Pomeroy Avenue, respectively, from upstream to downstream) and the confluence of the East and West Branches of the Housatonic River. The four monitoring areas represented by these five delimiters are numbered 1-4, respectively, moving downstream from the Lyman Street Bridge. In addition, each monitoring area is divided into sub-areas defined by the "east" (river-left [looking downstream]) and "west" (river-right) sides of the Housatonic River, with three subplots established on each side of the river within each monitoring area. A total of 24 permanent monitoring plots were evaluated as part of this work.

The 24 permanent monitoring plots were located and marked in the field. If the plot marker stakes could not be located, Stantec re-established the plot, based on construction plans used for plot-establishment in Spring 2006. Trees and shrubs within each plot were tallied by species and noted as "healthy" or "dead." "Dead" trees and shrubs were those that exhibited no foliage, and the inner cambium was dead throughout the entire above ground portion of the plant. Volunteers of species that were planted were included in the tally if they were greater than 12 inches in height and appeared to be likely to survive. Volunteers of other tree and shrub species were recorded separately and not included in the tally. Herbaceous cover and invasive plant cover were recorded to the nearest five percent.

A meander survey was performed along both banks of each reach of the river to collect qualitative data on plant survivorship, to observe invasive plant populations, and to verify that plots were representative of surrounding areas.

[1] It should be noted that on October 1, 2007 Woodlot Alternatives, Inc. merged with Stantec Consulting Services, Inc.

Also, supplemental vegetation monitoring work was performed to assess tree and shrub health within upland planting areas on residential and commercial properties within the 1.5-Mile Reach. The following properties were inspected: Parcel I8-24-1, Parcel I9-5-13, Parcel I6-1-66, Parcel I6-1-67, Parcel I6-1-68, Parcel I6-1-69, and Fred Garner Park (Parcel I7-1-101).

2.0 RESULTS

The results of the monitoring plot inspection and meander surveys are summarized in this section. A discussion of the results and a comparison to performance standards are provided in Section 3. Table 1 summarizes tree and shrub densities in each monitoring area. Table 2 summarizes percent herbaceous cover and percent invasive species cover. Table 3 summarizes tree and shrub densities in each monitoring plot.

2.1 Tree and Shrub Density/Survivorship

Table 1 provides a summary of the results of the Summer 2007 vegetation monitoring event for trees and shrubs, and includes the Spring 2007 results for comparison. Details of plot characteristics are presented in Table 3. The performance standard for trees and shrubs is 80 percent survivorship. In most monitoring areas, exact numbers of planted trees and shrubs were not available, so survivorship was estimated by comparing the current plant density to the expected plant density based on the design. In select areas where the plant count was known (i.e., plots 1-E-3, 3-W-1, 3-W-2, 3-W-3, 3-E-1, 3-E-3, and 4-E-2), the direct comparison of the current count to the original planted count was made. Two monitoring plots did not achieve the 80 percent tree density performance standard in Spring 2007, but after additional plantings, expanding the plot size, and adjusting target tree densities to reflect what was actually planted instead of the standard 500 or 700 trees per acre, all monitoring plots achieved 80 percent tree density performance standard.

Table 1. Comparison summary between Spring 2007 and Summer 2007 Monitoring Events

Monitoring Area	Performance Standard Summary					
	Spring 2007			Summer 2007		
	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm (West)	103%	152%	NA	103%	179%	NA
Lyman-Elm (East)	102%	137%	100%*	110%	127%	117%*
Elm-Dawes (West)	188%	140%	152%	198%	142%	274%
Elm-Dawes (East)	91%	113%	NA	91%	108%	NA
Dawes-Pomeroy (West)	138%	100%*	60%	126%	104%*	108%*
Dawes-Pomeroy (East)	137%	72%*	212%	147%	104%*	212%
Pomeroy-Confluence (West)	108%	115%	NA	104%	125%	NA
Pomeroy-Confluence (East)	215%	119%*	152%	203%	127%*	152%

* Indicates percent survivorship as compared to the number of actual trees and shrubs planted. Applies to one plot or two plots out of the three plots within a monitoring area.

NA = Not applicable

Stantec

2.2 Herbaceous Cover

Herbaceous cover was at or above 95 percent and therefore achieved the performance standard, in all but three of the monitoring plots (Table 2). Monitoring plot 1-E-3 exhibited 80 percent herbaceous cover. Bare ground in this plot appeared to be the result of herbicide treatment and maintenance to tree cages. Herbaceous growth in plot 1-E-3 has been very dense historically. Because of the established seed bank and the observation that soils in this location appear to be stable and protected by Geoweb®, no immediate action is recommended. Monitoring plot 2-W-1 exhibited 60 percent herbaceous plant cover (see photo 1). This monitoring plot did not achieve the herbaceous cover performance standard in 2006 as a result of hedge bindweed (*Calystegia sepium*) removal activities. Bare soil in 2007 was apparently the result of weed removal activities and tree cage maintenance. Re-seeding and mulching plot 2-W-1 and adjacent areas with a conservation seed mix is recommended. Monitoring plot 4-W-2 exhibited 90 percent herbaceous cover (see photo 2). Poor soil quality (lack of organic material) is considered a probable cause of reduced herbaceous growth in this area. At the time of the inspection, soils were stable with no indication of erosion. It is recommended that Monitoring Plot 4-W-2 be reevaluated in the spring of 2008 to assess the potential need for loam application and re-seeding.

2.3 Invasive Species Cover

Invasive species cover was below 5 percent in all monitoring plots (Table 2) and achieved the applicable performance standard. Invasive species encountered within monitoring plots included purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Polygonum cuspidatum*), Multiflora rose (*Rosa multiflora*), oriental bittersweet (*Celastrus orbiculata*), spotted knapweed (*Centaurea biebersteinii*), common mullein (*Verbascum thapsus*), reed canary-grass (*Phalaris arundinacea*), and cypress spurge (*Euphorbia cyparissias*). Individuals and populations of these species were frequently encountered above and below the planting areas (e.g., purple loosestrife growing in riprap), but were not included in calculations. Even though the performance standard was met, it is recommended that these populations of invasive species be controlled if possible to reduce the invasion rate of restored planting areas.

Table 2. Percent Herbaceous Cover and Percent Invasive Plant Species Cover Summary Information

Monitoring Area	Bank	Date Monitored	Plot	Herbaceous Cover (%)	Invasive Plant Cover (%)	Invasive Species
Lyman-Elm	West	8/13/2007	1-W-1	>95	<5	*Euphorbia cyparissias*
Lyman-Elm	West	8/13/2007	1-W-2	>95	<5	*Euphorbia cyparissias, Lythrum salicaria*
Lyman-Elm	West	8/13/2007	1-W-3	100	<5	*Celastrus orbiculata*
Monitoring Area Average				**>95**	**<5**	
Lyman-Elm	East	8/13/2007	*1-E-1*	100	<5	*Euphorbia cyparissias, Lythrum salicaria, Phalaris arundinacea*
Lyman-Elm	East	8/13/2007	*1-E-2*	>95	<5	*Euphorbia cyparissias, Lythrum salicaria*
Lyman-Elm	East	8/13/2007	*1-E-3*	80	<5	*Lythrum salicaria*
Monitoring Area Average				**<95**	**<5**	
Elm-Dawes	West	8/13/2007	*2-W-1*	60	<5	*Verbascum thapsus*
Elm-Dawes	West	8/13/2007	*2-W-2*	>95	0	
Elm-Dawes	West	8/13/2007	*2-W-3*	>95	<5	
Monitoring Area Average				**<95**	**<5**	
Elm-Dawes	East	8/13/2007	*2-E-1*	100	<5	
Elm-Dawes	East	8/13/2007	*2-E-2*	100	<5	*Verbascum thapsus, Centaurea biebersteinii*
Elm-Dawes	East	8/13/2007	*2-E-3*	>95	<5	*Lythrum salicaria*
Monitoring Area Average				**>95**	**<5**	
Dawes-Pomeroy	West	8/14/2007	*3-W-1*	>95	<5	*Lythrum salicaria, Centaurea biebersteinii, Verbascum thapsus, Euphorbia cyparissias*
Dawes-Pomeroy	West	8/14/2007	*3-W-2*	>95	0	
Dawes-Pomeroy	West	8/14/2007	*3-W-3*	>95	<5	*Centaurea biebersteinii, Euphorbia cyparissias*
Monitoring Area Average				**>95**	**<5**	
Dawes-Pomeroy	East	8/14/2007	*3-E-1*	>95	<5	*Centaurea biebersteinii, Rosa multiflora, Verbascum thapsus*
Dawes-Pomeroy	East	8/14/2007	*3-E-2*	100	<5	*Verbascum thapsus*
Dawes-Pomeroy	East	8/14/2007	*3-E-3*	>95	<5	*Euphorbia cyparissias, Lythrum salicaria, Centaurea biebersteinii*
Monitoring Area Average				**>95**	**<5**	
Pomeroy-Confluence	West	8/14/2007	*4-W-1*	>95	<5	*Euphorbia cyparissias*
Pomeroy-Confluence	West	8/14/2007	*4-W-2*	90	<5	*Euphorbia cyparissias, Centaurea biebersteinii, Robinia pseudoacacia*
Pomeroy-Confluence	West	8/14/2007	*4-W-3*	100	<5	*Polygonum cuspidatum, Lythrum salicaria*
Monitoring Area Average				**>95**	**<5**	
Pomeroy-Confluence	East	8/14/2007	*4-E-1*	>95	<5	
Pomeroy-Confluence	East	8/14/2007	*4-E-2*	100	<5	*Centaurea biebersteinii*
Pomeroy-Confluence	East	8/14/2007	*4-E-3*	100	<5	*Euphorbia cyparissias*
Monitoring Area Average				**>95**	**<5**	

2.4 Meander Survey Results

Lyman Street to Elm Street Reach

Recent supplemental tree plantings were observed in this reach and overall tree density is very high. Supplemental tree plantings were initiated due to beaver herbivory in this reach. Several trees were observed without protective tree cages, possibly from cages being removed during tree pruning operations. Overall, tree protectors on protective tree cages were well adjusted and lateral growth through tree cages had been correctly pruned. Loss of herbaceous cover (see photo 3), as well as several trees and shrubs, apparently the result of herbicide application, was observed. Five eastern cottonwood trees (*Populus deltoides)*, in excess of 20 feet in height, and one black willow (*Salix nigra*), within or adjacent to monitoring plot 1-E-2, were observed to be highly stressed and likely to die, apparently due to herbicide exposure (see photo 4). Approximately five percent of trees and shrubs may have been impacted by herbicide treatment in the Lyman Street to Elm Street reach.

Japanese knotweed was observed infrequently on east and west banks of this reach. Other invasive species noted include: Norway maple (*Acer platanoides*), multiflora rose, purple loosestrife, Cypress spurge, oriental bittersweet, and reed canary-grass. Percent cover of invasive species was similar to that recorded within monitoring plots and, therefore, appears to achieve the applicable performance standard.

Elm Street to Dawes Avenue Reach

Hedge bindweed (*Calystegia sepium*) was observed primarily on the west bank with in this reach, but not to the extent observed in previous regular vegetation monitoring events. Hedge bindweed should continue to be monitored and removed by hand from trees and shrubs. As noted in section 2.2, bare soil was observed within and adjacent to monitoring plot 2-W-1. It is recommended that this area be re-seeded with conservation seed mix and mulched this fall.

Several tree cages were lying on the ground on the east bank within this reach. It is recommended that these tree cages be re-staked, if still protecting live trees, or otherwise removed. Tree cages were observed to require maintenance, particularly in the vicinity of monitoring plot 2-E-1. Several live eastern cottonwoods were on the ground in this area and require propping up. Approximately 12 dead trees were observed on the east bank adjacent to STA 532+50. It is recommended that these trees be replaced. Some spray damage to herbaceous cover and trees was observed in this reach.

A substantial population of purple loosestrife was observed high on the bank between monitoring plots 2-W-2 and 2-W-3. Control of this purple loosestrife population is recommended. Other invasive species encountered in this reach include, multiflora rose, common mullein, spotted knapweed, Norway maple, Cypress spurge, and oriental bittersweet. Percent cover of invasive species was similar to that recorded within monitoring plots and therefore appears to achieve the applicable performance standard.

Dawes Avenue to Pomeroy Avenue Reach

Tree and shrub growth was generally healthy in this reach. Four shrubs within monitoring plot 4-W-3 were apparently mowed by the property owner. Shrub density within this plot still exceeds the performance standard. Lawn debris was observed to have been deposited on tree and shrub plantings behind a private residence between monitoring plots 3-W-2 and 3-W-3 (see photo 5). Minor spray damage to herbaceous cover and trees was observed in this reach.

Invasive species encountered in this reach include, Japanese knotweed, purple loosestrife, multiflora rose, common mullein, spotted knapweed, Norway maple, cypress spurge, coltsfoot (*Tussilago farfara*), and oriental bittersweet. Percent cover of invasive species was similar to that recorded within monitoring plots and, therefore, appears to achieve the applicable performance standard.

Pomeroy Avenue to Confluence Reach

Trees and shrubs on the west bank and upper east bank of this reach are generally demonstrating healthy growth. Some tree mortality was observed on the lower east bank of this reach. Shrubs on the east bank within the "GE planting area" are contained within protective cages. In addition to adversely affecting the shrub's growth, shrub cages are likely to be removed by currents and floating debris in this flood-prone area. It is recommended that all protective cages be removed from shrubs. Trees in this location are lacking tree protectors and evidence of damage caused by trees rubbing on tree cages is apparent (see photo 6). Tree protectors should be installed as soon as possible. Bark mulch was utilized instead of fiber mulch mats on trees and shrubs within the "GE planting area". Much of the bark mulch was removed by flood conditions in early 2006. As a result of the current lack of mulch, excessive competition from herbaceous growth as well as water stress under extreme drought conditions is possible.

Several red osier dogwoods (*Cornus sericea*), other shrubs, and one eastern cottonwood were apparently impacted by herbicide on the west bank of this reach.

Invasive species encountered in this reach include, Japanese knotweed, purple loosestrife, common mullein, spotted knapweed, cypress spurge, coltsfoot, and black locust (*Robinia pseudoacacia*). Percent cover of invasive species was similar to that recorded within monitoring plots and, therefore, appears to achieve the applicable performance standard.

2.5 Upland Planting Monitoring

Harry's Supermarket Parcel I8-24-1
No stressed or dead trees were observed within the upland planting area adjacent to Harry's Supermarket. Virginia creeper (*Parthenocissus quinquefolia*) was observed to be climbing on one white pine (*Pinus strobus*) and should be removed by hand from this tree (see photo 7). Hedge bind-weed (*Calystegia sepium*) was observed to be growing on one balsam fir (*Abies balsamea*) and should be removed by hand from this tree. Invasive species observed within the planting area include Japanese knotweed, black locust (*Robinia pseudoacacia*), and purple loosestrife. If invasive species are not controlled in this area by herbicide or regular mowing they will likely become prolific within a few years.

Brunswick Street Property I6-1-66
One white birch (*Betula papyrifera*), previously reported as "stressed", was observed to be dead. A second white birch, previously reported as "stressed", continues to be stressed. Japanese knotweed was observed to be invading the planting area from the eastern side of the property.

Brunswick Street Property I6-1-67
No dead trees were observed, but three white birches were observed to be stressed. Japanese knotweed was observed in various locations within this property.

Brunswick Street Properties I6-1-68 and I6-1-69
No dead trees or stressed trees were observed on these properties.

Fred Garner Park Parcel I7-1-101
All trees in upland planting areas at Fred Garner Park were apparently healthy. White pines previously reported as "stressed" appeared to be fully recovered and healthy at the time of the survey.

Maffucio Property I9-5-13
No dead trees or stressed trees were observed on this property.

3.0 DISCUSSION

Overall, healthy growth of planted species along with significant contribution from volunteers was observed during the monitoring event. Exceptions occurred where herbicide treatment apparently impacted planted trees and shrubs. Larger trees that were impacted by herbicide may have uptaken herbicide from soils, or herbicide may have entered through recent pruning cuts. Some plant species that were apparently targeted include native species such as staghorn sumac (*Rhus hirta*) and common horsetail (*Equisetum arvense*). Other species that were targeted are considered invasive in Massachusetts (i.e., cypress spurge, smooth bedstraw [*Galium mollugo*], common mullein, and spotted knapweed), but typically require full sunlight and may not be a problem once the tree canopy closes in. Although the presence of invasive species is not desirable within restoration planting areas, some modification of the herbicide treatment regime is advisable due to the observed losses of planted stock and herbaceous cover. Stantec recommends that herbicide not be utilized within 3 feet of any native tree or shrub. Stantec also recommends that the list of targeted invasive species be limited to Japanese knotweed, purple loosestrife, common reed (*Phragmites australis*), oriental bittersweet, and invasive woody species including Norway maple, black locust, common buckthorn (*Rhamnus cathartica*), glossy buckthorn (*Frangula alnus*), Morrow's honeysuckle (*Lonicera morrowii*), border privet (*Ligustrum obtusifolium*), multiflora rose, and others. Herbicide spray should not be applied under windy conditions which may contribute to mortality of desirable species by spray drift.

Percent herbaceous cover was below the 95 percent performance standard within three plots. Monitoring plot 1-E-3 (80% herbaceous cover) exhibits stabilized soils with a potentially robust seed bank. No action is recommended for monitoring plot 1-E-3. Monitoring plot 2-W-1 (60% herbaceous cover) exhibits unstable soils with a seed bank potentially high in hedge bindweed. Re-seeding with conservation seed mix and mulching monitoring plot 2-W-1 is recommended. Monitoring plot 4-W-2 (90% herbaceous cover) exhibits relatively stable, but highly mineral (sandy) soils. It is recommended that this location be reevaluated in Spring 2008 to assess the necessity for restorative actions.

All monitoring plots achieved the applicable performance standard of less than 5 percent invasive species cover. As suggested above, a modified herbicide treatment regime is recommended to reduce impacts to desirable native species.

Tree and shrub density/survivorship was above the 80 percent performance standard for all monitoring plots. Monitoring plots 3-W-1 and 3-E-1 were enlarged in order to better represent tree and shrub densities within residential areas of this reach. Monitoring plot 3-W-1 was extended to 212 feet in length and monitoring plot was extended to 145 feet in length. Resulting tree and shrub densities as shown in Table 3 will serve as target densities for these plots in future vegetation monitoring surveys. Volunteer tree species occurring in these plots were not used in calculating the target densities. A more detailed discussion of how tree and shrub densities were determined is provided below. See Table 1 for the summary of tree and shrub densities within monitoring areas.

Calculations of tree and shrub densities were based on the presence or absence of shrub clumps. If shrubs were evenly distributed within the monitoring area, shrub density should have been 730 shrubs/acre and tree density should be 700 trees/acre in normal plots or 500 trees/acre in areas with Geoweb ®. If a defined shrub clump was observed, the area of the shrub clump was delineated and resulting shrub density within the clump should have been 2,723 shrubs/acre if shrubs were planted 4 feet on center. The density of 2,723 shrubs per acre was established by utilizing the shrub clump planting design of shrubs installed 4-foot on center. One shrub occupies 16 square feet. 43,560 feet (1 acre) divided by 16 square feet results in a target density of 2,722.5 shrubs per acre within shrub clumps. Table 2 summarizes tree and shrub densities within monitoring plots.

For several areas within 1.5 Mile Reach, the planting schemes did not follow the recommended planting densities due to needs or requests of residential property owners or the physical conditions of the riverbanks. If a monitoring plot was located within the areas that the standard planting densities were not followed, the assessment of the plot was based on the original number of plants planted. Such plots included 1-E-3, 3-W-1, 3-W-2, 3-W-3, 3-E-1, 3-E-3, and 4-E-2.

4.0 RECOMMENDATIONS

The following actions are recommended for implementation during the Fall of 2007:

Riverbank Planting Areas

- Install tree cages on trees exhibiting “pole form” capable of accommodating such protection within Lyman to Elm Street reach.
- Re-seed and mulch plot 2-W-1 and adjacent areas.
- Restrict herbicide use to only Japanese knotweed, common reed, purple loosestrife, Norway maple, black locust, and invasive woody vines and shrubs.
- Restrict herbicide use within 3 feet of planted trees and shrubs.
- Restrict herbicide use under windy conditions.
- Continue hedge bindweed removal.
- Continue tree cage maintenance.
- Install tree protectors on cages on east bank of Pomeroy to Confluence reach.
- Control of purple loosestrife population between plots 2-W-2 and 2-W-3.
- Tree cage maintenance adjacent to plot 2-E-1.
- Replacement of 12 trees at STA 532+50 (east bank). Recommended species for replacement are box elder and eastern cottonwood.

Upland Planting Areas

- Remove by hand Virginia creeper from one white pine and hedge bind-weed from one balsam fir on Parcel I8-24-1 **(**Harry’s Supermarket)
- Control invasive species (i.e., Japanese knotweed, black locust, and purple loosestrife) observed within Parcel I8-24-1 **(**Harry’s Supermarket).
- Plant 2 red maple (*Acer rubrum*) on Parcel I6-1-66 to replace the dead white birch

Photo 1. Bare soil recommended for re-seeding in monitoring plot 2-W-1.

Photo 2. Highly mineral soils of Monitoring Plot 4-W-2 exhibiting reduced herbaceous cover.

Photo 3. Loss of herbaceous cover apparently resulting from herbicide treatment.

Photo 4. Eastern cottonwood trees apparently stressed by herbicide exposure.

Photo 5. Lawn debris placed on planted trees and shrubs behind private residence.

Photo 6. Damage caused to eastern cottonwood tree resulting from lack of tree protector.

Photo 7. Virginia creeper climbing on white pine in upland planting area adjacent to Harry's Supermarket.

Table 3. Monitoring Plot Details
Stantec Inc.
WAI PN 104141.03, Summer 2007 Vegetation Monitoring, **Date: 5-Oct-07**
1.5 Mile Reach, Housatonic River, Pittsfield, MA **By: TBC**
Monitoring Performed by Todd Chadwell, Stantec Inc. **Checked By:**

					Dimensions					Trees						Shrubs							Total Plants
Reach	Bank	Plot No.	Type	Date	L (ft)	Slope W (ft)	Height (ft)[1]	W (ft)	Area (ft^2)	BW	SM	EC	BE	Total Trees	Tree Density (Regular)	ROD	SD	WH	CC	NA	Total Shrubs	Shrub Density	Total Plants
Lyman-Elm	West	1-W-1	Regular	8/13/2007	61	10	3	9.5	582	3	11	8	5	27	2021	0	0	0	0	0	0	0	27
Lyman-Elm	West	1-W-2	Regular	8/13/2007	32	31	4.5	30.7	981	3	12	6	4	25	1110	2	1	0	0	1	4	178	29
Lyman-Elm	West	1-W-3	Regular	8/13/2007	67	22	5	21.4	1435	5	3	8	5	21	637	9	4	4	5	4	26	789	47
Monitoring Area Average																							
Lyman-Elm	East	*1-E-1*	Regular	8/13/2007	139	12	2	11.8	1645	9	5	7	6	27	715	12	16	6	8	6	48	1271	75
Lyman-Elm	East	*1-E-2*	Regular	8/13/2007	45	34.5	2	34.4	1550	7	6	12	13	38	1068	1	1	0	0	0	2	56	40
Lyman-Elm	East	*1-E-3*	Geoweb	8/13/2007	70	22	13	17.7	1242	1	0	0	6	7	245	12	5	0	4	0	21	736	28
Monitoring Area Average																							
Elm-Dawes	West	*2-W-1*	Regular	8/13/2007	63	18	6.5	16.8	1057	5	5	10	4	24	989	7	2	0	0	1	10	412	34
Elm-Dawes	West	*2-W-2*	Regular	8/13/2007	17	57	19	53.7	914	5	1	8	7	21	1001	1	0	0	0	0	1	48	22
Elm-Dawes	West	*2-W-3*	Geoweb	8/13/2007	66	14	11	8.7	572	0	1	1	16	18	1372	0	10	1	5	3	19	1448	37
Monitoring Area Average																							
Elm-Dawes	East	*2-E-1*	Regular	8/13/2007	33	31	15	27.1	895	2	0	7	3	12	584	8	7	6	2	3	26	1265	38
Elm-Dawes	East	*2-E-2*	Regular	8/13/2007	27	35	9	33.8	913	2	3	8	3	16	763	5	0	0	0	0	5	238	21
Elm-Dawes	East	*2-E-3*	Regular	8/13/2007	141	11	5	9.8	1382	4	8	10	7	29	914	0	16	0	0	1	17	536	46
Monitoring Area Average																							
Dawes-Pomeroy	West	*3-W-1*	Geoweb	8/14/2007	212	7	1	6.0	1272	1	6	1	5	13	445	10	20	2	3	4	39	1336	52
Dawes-Pomeroy	West	*3-W-2*	Regular	8/14/2007	67	14	0	14.0	938	3	3	1	2	9	418	8	3	0	0	3	14	650	23
Dawes-Pomeroy	West	*3-W-3*	Regular	8/14/2007	105	13	0	13.0	1365	6	4	1	2	13	415	15	0	4	3	2	24	766	37
Monitoring Area Average																							
Dawes-Pomeroy	East	*3-E-1*	Regular	8/14/2007	145	10	4	10.0	1450	1	5	4	4	14	421	0	22	3	5	4	34	1021	48
Dawes-Pomeroy	East	*3-E-2*	Geoweb	8/14/2007	38	12	7	9.7	370	1	0	7	1	9	1058	5	0	0	1	0	6	706	15
Dawes-Pomeroy	East	*3-E-3*	Regular	8/14/2007	77	10	0	10.0	770	6	4	2	0	12	679	11	1	2	3	3	20	1131	32
Monitoring Area Average																							
Pomeroy-Confluence	West	*4-W-1*	Regular	8/14/2007	50	18	0	18.0	900	5	5	2	6	18	871	6	0	0	0	0	6	290	24
Pomeroy-Confluence	West	*4-W-2*	Regular	8/14/2007	50	25	0	25.0	1250	1	4	10	6	21	732	5	0	0	0	0	5	174	26
Pomeroy-Confluence	West	*4-W-3*	Regular	8/14/2007	74	12	0	12.0	888	3	2	11	3	19	932	11	3	6	5	5	30	1472	49
Monitoring Area Average																							
Pomeroy-Confluence	East	*4-E-1*	Geoweb	8/14/2007	50	8	0	8.0	400	2	2	2	1	7	762	6	0	0	0	0	6	653	13
Pomeroy-Confluence	East	*4-E-2*	Regular	8/14/2007	50	10	0	10.0	500	2	0	1	1	4	348	0	7	5	1	3	16	1394	20
Pomeroy-Confluence	East	*4-E-3*	Regular	8/14/2007	50	10	0	10.0	500	3	5	2	4	14	1220	0	7	0	6	5	18	1568	32
Monitoring Area Average																							

Notes:

1: **From As-Built CAD Drawing**
2: **3-W-1 Height based on field observation**
3: **3-E-1 Height based on field observation**

Species Legend

BW = black willow
SM = silver maple
EC = eastern cottonwood
BE = box elder
SD = silky dogwood
ROD = red-osier dogwood
NA= northern arrow-wood
WH = winterberry holly
CC = chokecherry

Table 3. Monitoring Plot Details (continued)
Stantec Inc.
WAI PN 104141.03, Summer 2007 Vegetation Monitoring
1.5 Mile Reach, Housatonic River, Pittsfield, MA
Monitoring Performed by Todd Chadwell, Stantec Inc.

					Shrub Clumps							Trees				Performance Standard Summary		
Reach	Bank	Plot No.	Type	Plot Characterization	Length	Width	Shrub No.	Area*	Shrub D (shrubs/acre)	Target D (shrubs/acre)	% Target D	Area	Tree Density (tree/acre)	Target D (tree/acre)	% Target D	Shrubs	Trees (non-GeoWeb)	Trees (Geoweb)
Lyman-Elm	West	1-W-1	Regular	no shrubs clumps or RO band, shrub clump immediately upstream								582	2021	700	289%			
Lyman-Elm	West	1-W-2	Regular	4 shrubs projecting in from clump upstream, RO band incomplete								981	1110	700	159%			
Lyman-Elm	West	1-W-3	Regular	shrub clump approx. 24x14ft at S edge of plot	24	14	17	264	2806	2723	103%	1435	637	700	91%			
Monitoring Area Average												Monitoring Area Average				103%	179%	NA
Lyman-Elm	East	*1-E-1*	Regular	shrub clump approx. 77x8ft in center of plot, RO band 77 ft in length	77	8	36	484	3241	2723	119%	1645	715	700	102%			
Lyman-Elm	East	*1-E-2*	Regular	shrub clump immediately upstream								1550	1068	700	153%			
Lyman-Elm	East	*1-E-3*	Geoweb	all shrubs with interspersed trees, shrubs 4-10ft OC, avg 7 ft OC				1242	736	730	101%	1242	245	210	117%			
Monitoring Area Average												Monitoring Area Average				110%	127%	117%
Elm-Dawes	West	*2-W-1*	Regular	2 shrubs projecting in from clump upstream								1057	989	700	141%			
Elm-Dawes	West	*2-W-2*	Regular	RO band unevenly spaced, shrub clump immed. upstream								914	1001	700	143%			
Elm-Dawes	West	*2-W-3*	Geoweb	shrubs distributed evenly with trees				572	1448	730	198%	572	1372	500	274%			
Monitoring Area Average												Monitoring Area Average				198%	142%	274%
Elm-Dawes	East	*2-E-1*	Regular	shrub clump approx. 1/2 of plot extending upstream (triangle)			18	316	2484	2723	91%	895	584	700	83%			
Elm-Dawes	East	*2-E-2*	Regular	no shrub clumps, shrub clump approx. 200 ft upstream & downstream								913	763	700	109%			
Elm-Dawes	East	*2-E-3*	Regular	no shrub clumps, shrub clump approx. 300 ft upstream								1382	914	700	131%			
Monitoring Area Average												Monitoring Area Average				91%	108%	NA
Dawes-Pomeroy	West	*3-W-1*	Geoweb	all shrub clump w/ trees interspersed, some area void of plantings				1272	1336	730	183%	1272	445	411^	108%			
Dawes-Pomeroy	West	*3-W-2*	Regular	shrubs distributed evenly with trees, GE planting adjacent				938	650	730	89%	938	418	418	100%			
Dawes-Pomeroy	West	*3-W-3*	Regular	shrubs distributed evenly, some area void, GE planting adjacent				1365	766	730	105%	1365	415	383	108%			
Monitoring Area Average												Monitoring Area Average				126%	104%	108%
Dawes-Pomeroy	East	*3-E-1*	Regular	shrub clump approx. 16x6ft w/ some interspersed trees				1450	1021	730	140%	1450	421	391^	108%			
Dawes-Pomeroy	East	*3-E-2*	Geoweb	no shrub clumps, shrub clump approx. 120 ft downstream								370	1058	500	212%			
Dawes-Pomeroy	East	*3-E-3*	Regular	shrubs distributed evenly with trees, GE planting adjacent				770	1131	730	155%	770	679	679	100%			
Monitoring Area Average												Monitoring Area Average				147%	104%	212%
Pomeroy-Confluence	West	*4-W-1*	Regular	Shrubs in adjacent WMECO ROW								900	920	700	131%			
Pomeroy-Confluence	West	*4-W-2*	Regular	Shrubs in adjacent WMECO ROW								1250	767	700	110%			
Pomeroy-Confluence	West	*4-W-3*	Regular	Shrub clump approximately 1/2 of plot	40	10	26	400	2831	2723	104%	888	932	700	133%			
Monitoring Area Average												Monitoring Area Average				104%	125%	NA
Pomeroy-Confluence	East	*4-E-1*	Geoweb	Shrub clump adjacent to plot								400	762	500	152%			
Pomeroy-Confluence	East	*4-E-2*	Regular	shrubs distributed evenly with trees				500	1394	730	191%	500	348	436**	80%			
Pomeroy-Confluence	East	*4-E-3*	Regular	shrubs distributed evenly with trees				500	1568	730	215%	500	1220	700	174%			
Monitoring Area Average												Monitoring Area Average				203%	127%	152%

Notes:

Target Planting Densities

	Normal	Geoweb	
Trees:	700	500	per acre
Shrubs:	730	730	per acre
Total:	1430	1230	per acre

* area of ellipse or triangle for shrub clumps

shrub clump

denotes plots where survivorship criterion is based on actual number of trees planted.

Assessment of sample area (plot) based on original number of trees planted

Plot #: *(1-E-3)* - Six trees originally planted within plot, with 117% survivability to date

Plot #: *(3-W-1)* - Thirteen trees originally planted within plot, with 108% survivability to date

Plot #: *(3-W-2)* - Nine trees originally planted within plot, with 100% survivability to date

Plot #: *(3-W-3)* - Twelve trees originally planted within plot, with 108% survivability to date

Plot #: *(3-E-1)* - Fourteen trees originally planted within plot, with 108% survivability to date

Plot #: *(3-E-3)* - Twelve trees originally planted within plot, with 100% survivability to date

Plot #: *(4-E-2)* - Five trees originally planted within plot, with 80% survivability to date

^ - Based on observations made during the 2007 Spring inspection, it was recommended that additional trees be planted within the entire residential area that these sample areas/plots represent. It was also recommended that the current sample area/plots be modified and enlarged in order to better represent the entire residential area the plots are within. Therefore, the assessment in the 2007 Summer inspection was based on a larger area, and the target density were based on live number of plants plus the recommended additional trees planted in the Spring 2007. The target density for sample area/plot 3-W-1 is 411 tree/acre and for 3-E-1 is 391 tree/acre.

** - Based on observations made during the 2007 Summer inspection, it was determiend that additional tree planting will be conducted in areas within Plot 4-E-2 and areas adjacent to the plot to raise the tree density in those areas to approximately 700 trees/acre. Therefore in the future a the Target Density for Plot 4-E-2 will change.

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/13/07 7:46AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: overcast, cool

Planting Area Location: I-W-1
Riverbank Length (ft): _____ Avg width (ft): _____
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:

Random Sample Location Number: _____ Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood		
Silver Maple	||| |||	11	Silky Dogwood		
Eastern Cottonwood	||| III	8	Winterberry Holly		
Box Elder	||	5	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 27 **Total Live Shrubs:** 0

Herbaceous Cover (%): 97%, a little sprig damage, some mechanical damage

Invasive Plant Cover (%): Some purple loosestrife in riprap, less than 5%.

Meander Survey Comments (Use Additional Sheets As Necessary):

1st photo - looking downstream
2nd photo - from toe of slope
3rd photo - looking upstream

no trees planted due to beaver damage

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 8/13/07 2:33AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: HW-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	II	2
Silver Maple	IIII IIII II	12	Silky Dogwood	I	1
Eastern Cottonwood	IIII I	6	Winterberry Holly		
Box Elder	III	4	Chokecherry		
			Northern Arrowwood	I	1

Total Live Trees: 25 **Total Live Shrubs:** 4

Herbaceous Cover (%): greater than 95%

Invasive Plant Cover (%): Sparganium, purple loosestrife, bird Straw, less than 5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Note - Several cages have been removed, not sure why?

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 8/13/07 9:22 AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: overcast cool

Planting Area Location: I-W-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	𝍸 ||||	9
Silver Maple	|||	3	Silky Dogwood	||||	4
Eastern Cottonwood	𝍸 |||	(5) 8	Winterberry Holly	||||	4
Box Elder	𝍸	5	Chokecherry	𝍸	5
			Northern Arrowwood	||||	4

Total Live Trees: (18) 21 **Total Live Shrubs:** 26

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): bittersweet, less than 5%

Meander Survey Comments (Use Additional Sheets As Necessary):

3 cottonwoods outside of plot included in count, as they had previously been incorrectly excluded

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA — Page ___ of ___

Observer(s): TC, MS — Date: 8/13/07, 11:00AM

Phase: ________ Flow @ Coltsville (cfs)______ Weather: cloudy, breeze, 70's

Planting Area Location: 1-E-1

Riverbank Length (ft): ________ Avg width (ft): ________

Planting Area (sf): ________ 10-20% Area (sf): ________

Comments:

Random Sample Location Number: ________ Riverbank length (ft): ______ Width (ft): ____

Slope length (ft): ________ Sample Area (sf): ________

Plant Survivorship:

Trees	***Quantity (live)***	***Total***	***Shrubs***	***Quantity (live)***	***Total***
Black Willow	~~||||~~ ||||	9	Red-osier Dogwood	~~||||~~ ~~||||~~ ||	12
Silver Maple	~~||||~~	5	Silky Dogwood	~~||||~~ ~~||||~~ ~~||||~~		16
Eastern Cottonwood	~~||||~~ ||	7	Winterberry Holly	~~||||~~		6
Box Elder	~~||||~~		6	Chokecherry	~~||||~~ |||	8
			Northern Arrowwood	~~||||~~		6

Total Live Trees: 27 **Total Live Shrubs:** 48

Herbaceous Cover (%): 100

Invasive Plant Cover (%): spurge, Purple LS, bedstraw, phal arun – <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA   Page ___ of ____

Observer(s): TC, MS   Date: 8/13/07, 10:33
Phase: ________ Flow @ Coltsville (cfs)______ Weather: overcast, warm, humid 70s

Planting Area Location: 1-E-2
Riverbank Length (ft): ________ Avg width (ft): ________
Planting Area (sf): ________ 10-20% Area (sf): ________
Comments:

Random Sample Location Number: ________ Riverbank length (ft): ______ Width (ft): ____
Slope length (ft): ________ Sample Area (sf): ________

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	~~(D) 卌~~ 卌 II (D)	7 (D)	Red-osier Dogwood	I	I
Silver Maple	~~卌~~ 卌 I	6	Silky Dogwood	I	I
Eastern Cottonwood	~~(D) 卌 II~~ 卌 卌 I (D) V-1	11 V-1 (D)	Winterberry Holly		
Box Elder	~~卌 卌~~ 卌 卌 I V-2	11 V-2 (D)	Chokecherry		
	(D)		Northern Arrowwood		

Total Live Trees: 35+=38 **Total Live Shrubs:** 2

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): spurge, bedstraw, loosestrife, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

stressed – 5 Cottonwoods potentially stressed from spraying

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 7/17/07 10:00am

Phase: _____ Flow @ Coltsville (cfs)_____ Weather: overcast, cool

Planting Area Location: 1-E-3

Riverbank Length (ft): _____ Avg width (ft):_____

Planting Area (sf):_____ 10-20% Area (sf):_____

Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____

Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	𝍸 𝍸 11	12
Silver Maple			Silky Dogwood	𝍸	5
Eastern Cottonwood			Winterberry Holly		
Box Elder	𝍸 V-1	5 plus V-1	Chokecherry	𝍸	4
			Northern Arrowwood		

Total Live Trees: 6 + V-1 = 7 **Total Live Shrubs:** 21

Herbaceous Cover (%): prior to spray damage 15%, after ~ 80%

Invasive Plant Cover (%): bird straw, loose straw, less than 5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TC, MS Date: 8/13/07 1:34pm
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: sunny, 80s

Planting Area Location: Z-W-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	IIII	5	Red-osier Dogwood	IIII II	7
Silver Maple	IIII	5	Silky Dogwood	II	2
Eastern Cottonwood	IIII IIII	10	Winterberry Holly		
Box Elder	IIII 0	4+0	Chokecherry		
			Northern Arrowwood	I	1

Total Live Trees: 24 (1 dead) **Total Live Shrubs:** 10

Herbaceous Cover (%): 60%

Invasive Plant Cover (%): mullein, purple loosestrife (1 plant), bindweed (very little), <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

seeding recommended

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/13/07 2:05PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: some clouds sunny 70s

Planting Area Location: 2-W-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	1	1
Silver Maple	1	1	Silky Dogwood		
Eastern Cottonwood	𝍸 11	8	Winterberry Holly		
Box Elder	𝍸 11	7	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 21 **Total Live Shrubs:** 1

Herbaceous Cover (%): >95%, groundhog holes

Invasive Plant Cover (%): 0% small purple loosestrife in riprap

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA   Page ___ of ___

Observer(s): TC, MS   Date: 8/13/07, 2:40PM
Phase: ______ Flow @ Coltsville (cfs)______ Weather: clouds, 80s

Planting Area Location: 2-1-2
Riverbank Length (ft): ______ Avg width (ft): ______
Planting Area (sf): ______ 10-20% Area (sf): ______
Comments:

Random Sample Location Number: ______ Riverbank length (ft): ______ Width (ft): ______
Slope length (ft): ______ Sample Area (sf): ______

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow			Red-osier Dogwood		
Silver Maple	|	1	Silky Dogwood	~~||||~~ ~~||||~~	10
Eastern Cottonwood	|	1	Winterberry Holly	|	1
Box Elder	~~||||~~	5	Chokecherry	~~||||~~	5
Volunteers	~~||||~~ ~~||||~~ |	11			
			Northern Arrowwood	|||	3

Total Live Trees: 18 **Total Live Shrubs:** 19

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/13/07 1:33PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: Sunny, 80's

Planting Area Location: Z-E-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	II	2	Red-osier Dogwood	IIII III	8
Silver Maple			Silky Dogwood	IIII II	7
Eastern Cottonwood	IIII II	7	Winterberry Holly	IIII I	6
Box Elder	III	3	Chokecherry	II	2
			Northern Arrowwood	III	3

Total Live Trees: 12 **Total Live Shrubs:** 26

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 8/13/07 4:04 PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: Sunny, Some clouds 80's

Planting Area Location: 2-E-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	II	2	Red-osier Dogwood	IIII	5
Silver Maple	III	3	Silky Dogwood		
Eastern Cottonwood	IIII III	8	Winterberry Holly		
Box Elder	III	3	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 16 **Total Live Shrubs:** 5

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): mullein, knapweed <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/13/07 ~2:00pm
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: cloudy, humid, 80s

Planting Area Location: 2-E-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	IIII (1) (1)	4 + (2)	Red-osier Dogwood		
Silver Maple	IIII	8	Silky Dogwood	IIII IIII IIII	16
Eastern Cottonwood	IIII IIII (1)	10 + (1)	Winterberry Holly		
Box Elder	IIII I	7	Chokecherry		
			Northern Arrowwood	1	1

Total Live Trees: 29 + (3) **Total Live Shrubs:** 17

Herbaceous Cover (%): 95%, 15% spray damage to herb layer

Invasive Plant Cover (%): Purple loosestrife, bedstraw, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

No core maintenance performed
- trees need to be staked up
- dead trees need to be removed

1 load willow from spraying

Many upper cottonwoods down

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/14/07, 2:23pm
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: Sunny, 70s

Planting Area Location: 3-MW-1
Riverbank Length (ft): 212' Avg width (ft): 8', 9', 5', 5'
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:

Random Sample Location Number: _____ Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	𝍸 𝍸	10
Silver Maple	𝍸 I	6	Silky Dogwood	𝍸 𝍸 𝍸 𝍸	20
Eastern Cottonwood	1	1	Winterberry Holly	II	2
Box Elder	IIII V I	5	Chokecherry	III	3
			Northern Arrowwood	IIII	4

Total Live Trees: 13 **Total Live Shrubs:** 39

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): Knotweed, purple loosestrife, mullein, <5%
spurge

Meander Survey Comments (Use Additional Sheets As Necessary):

Vetch taking over a patch on N. end
Bindweed getting thinkz
Willow – pinning reed, growing through cage

WOODLOT ALTERNATIVES, INC.

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA   Page ___ of ___

Observer(s): TC, MS   Date: 8/14/07 2:47PM
Phase: ______ Flow @ Coltsville (cfs) ______ Weather: sunny, 70's

Planting Area Location: 3-M-2
Riverbank Length (ft): ______ Avg width (ft): ______
Planting Area (sf): ______ 10-20% Area (sf): ______
Comments:

Random Sample Location Number: ______ Riverbank length (ft): ______ Width (ft): ______
Slope length (ft): ______ Sample Area (sf): ______

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	~~IIII~~ III	8
Silver Maple	III	3	Silky Dogwood	III	3
Eastern Cottonwood	I	1	Winterberry Holly		
Box Elder	II	2	Chokecherry		
			Northern Arrowwood	III	3

Total Live Trees: 9 **Total Live Shrubs:** 14

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): 0 - all mowed

Meander Survey Comments (Use Additional Sheets As Necessary):

Mullein below plot and across to riprap & purple loosestrife below plot in riprap
Serviceberry - 2 planted

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ____

Observer(s): TC, MS Date: 8/14/09 3:20PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: _____

Planting Area Location: 3-4-3
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	6	6	Red-osier Dogwood	15	15
Silver Maple	4	4	Silky Dogwood		
Eastern Cottonwood	1	1	Winterberry Holly	4	4
Box Elder	2	2	Chokecherry	3	3
			Northern Arrowwood	2	2

MOWED 4

Total Live Trees: 13 **Total Live Shrubs:** 24 + 4 mowed

Herbaceous Cover (%): >75%

Invasive Plant Cover (%): Spurge <5% knapweed

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TC, MS Date: 8/14/07 1:55PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: sunny, 70s

Planting Area Location: 3-E-1
Riverbank Length (ft): 145ft Avg width (ft): 9', 10', 10' - 10' avg
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:

Random Sample Location Number: _____ Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	I	1	Red-osier Dogwood		
Silver Maple	IIII	5	Silky Dogwood	IIII IIII IIII IIII II	22
Eastern Cottonwood	IIII	4	Winterberry Holly	III D	3 (1)
Box Elder	III I	4	Chokecherry	IIII	5
			Northern Arrowwood	III	4

Total Live Trees: 14 **Total Live Shrubs:** 34 +(1)

Herbaceous Cover (%): >95%.

Invasive Plant Cover (%): mullein, knapweed, rosa multiflora, bedstraw, <5%.

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 9/14/07 1:09PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: sunny/clear, ~75s

Planting Area Location: 3-E-2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	IIII	5
Silver Maple			Silky Dogwood		
Eastern Cottonwood	IIII	7	Winterberry Holly		
Box Elder	1	1	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 9 **Total Live Shrubs:** 5

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): milkw, < 5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TC, MS Date: 8/14/07 12:47PM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: sunny low 70s

Planting Area Location: 3-E-3
Riverbank Length (ft): _____ Avg width (ft): _____
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:

Random Sample Location Number: _____ Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	IIII	6	Red-osier Dogwood	IIII IIII I	11
Silver Maple	IIII	4	Silky Dogwood	I	1
Eastern Cottonwood	II	2	Winterberry Holly	II	2
Box Elder			Chokecherry	III	3
			Northern Arrowwood	III	3

Total Live Trees: 12 **Total Live Shrubs:** 20

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): Purple loosestrife, knapweed, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Shrub cages have been removed

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TC, MS Date: 7/14/07 9:38AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: clear, 75

Planting Area Location: 4-W-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	𝍸	5	Red-osier Dogwood	𝍸 1 (spray died)	4 (1)
Silver Maple	𝍸	5	Silky Dogwood	0	
Eastern Cottonwood	11 (1)	2 (1)	Winterberry Holly		
Box Elder	𝍸 1	6	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 18 +(1) **Total Live Shrubs:** 6 +(1)

Herbaceous Cover (%): 7 95%

Invasive Plant Cover (%): Spurge, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

1 cottonwood does not have a cage - out of plot
1 cottonwood - dead from spray

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of _____

Observer(s): TC, MS Date: 8/14/07 9:11AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: clear, sunny, 70

Planting Area Location: 4-Mar 2
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	1	Red-osier Dogwood	IIII (1)	5 (1)
Silver Maple	III	4	Silky Dogwood		
Eastern Cottonwood	IIII IIII (1)	10 (1)	Winterberry Holly		
Box Elder	IIII I	6	Chokecherry		
			Northern Arrowwood		

Total Live Trees: 21 and (1) **Total Live Shrubs:** 5 and (1)

Herbaceous Cover (%): 90%

Invasive Plant Cover (%): spurge, Multiflora, blackberry, knapweed < 5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Red osier killed by spray

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA

Page ___ of ___

Observer(s): TC, MS

Date: 8/14/07 9:22 AM

Phase: ___ Flow @ Coltsville (cfs) ___ Weather: clear, warming, 68°

Planting Area Location: 4-W-3

Riverbank Length (ft): ___ Avg width (ft): ___

Planting Area (sf): ___ 10-20% Area (sf): ___

Comments:

Random Sample Location Number: ___ Riverbank length (ft): ___ Width (ft): ___

Slope length (ft): ___ Sample Area (sf): ___

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood	~~IIII~~ ~~IIII~~ I	11
Silver Maple	II	2	Silky Dogwood	III	3
Eastern Cottonwood	~~IIII~~ II V-IIII	7 V-4	Winterberry Holly	~~IIII~~ I	6
Box Elder	III	3	Chokecherry	~~IIII~~	5
			Northern Arrowwood	~~IIII~~	5

Total Live Trees: 15, 19 (w/V) **Total Live Shrubs:** 30

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): jap. knotweed, purple loosestrife <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TC, MS Date: 8/14/07 10:00AM
Phase: _____ Flow @ Coltsville (cfs)_____ Weather: clear, sunny, ~68°

Planting Area Location: 4-E-1
Riverbank Length (ft): _____ Avg width (ft):_____
Planting Area (sf):_____ 10-20% Area (sf):_____
Comments:

Random Sample Location Number:_____ Riverbank length (ft):_____ Width (ft):____
Slope length (ft):_____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	1	2	Red-osier Dogwood	IIII	6
Silver Maple	11	2	Silky Dogwood		
Eastern Cottonwood	11	2	Winterberry Holly		
Box Elder	1	1	Chokecherry		
	1		Northern Arrowwood		

Total Live Trees: 7 **Total Live Shrubs:** 6

Herbaceous Cover (%): >95%

Invasive Plant Cover (%): <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA   Page ___ of ___

Observer(s): TC, MS   Date: 8/14/07 10:24 AM [illegible] 10:31 AM [illegible]

Phase: ______ Flow @ Coltsville (cfs) ______ Weather: clear sunny / 70

Planting Area Location: 4-E-2

Riverbank Length (ft): ______ Avg width (ft): ______

Planting Area (sf): ______ 10-20% Area (sf): ______

Comments:

Random Sample Location Number: ______ Riverbank length (ft): ______ Width (ft): ______

Slope length (ft): ______ Sample Area (sf): ______

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	ll	2	Red-osier Dogwood		
Silver Maple			Silky Dogwood	~~llll~~ ll	7
Eastern Cottonwood	l	1	Winterberry Holly	~~llll~~	5
Box Elder	T (growing from lateral layer?) (1)	(1)	Chokecherry	l	1
			Northern Arrowwood	lll	3

Total Live Trees: 4 + (1)   **Total Live Shrubs:** 16

Herbaceous Cover (%): 100%

Invasive Plant Cover (%): Knapweed, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

Revegetation Monitoring Field Form

1.5 Mile Reach, GE/Housatonic River Site, Pittsfield, MA Page ___ of ___

Observer(s): TG MS Date: 8/14/07 10:53AM
Phase: _____ Flow @ Coltsville (cfs) _____ Weather: clear, sunny 70

Planting Area Location: 4E-3
Riverbank Length (ft): _____ Avg width (ft): _____
Planting Area (sf): _____ 10-20% Area (sf): _____
Comments:

Random Sample Location Number: _____ Riverbank length (ft): _____ Width (ft): ____
Slope length (ft): _____ Sample Area (sf): _____

Plant Survivorship:

Trees	*Quantity (live)*	*Total*	*Shrubs*	*Quantity (live)*	*Total*
Black Willow	III	3	Red-osier Dogwood		
Silver Maple	IIII	5	Silky Dogwood	IIII	7
Eastern Cottonwood	II	2	Winterberry Holly		
Box Elder	IIII (D)	4 (2)	Chokecherry	IIII I	6 (1)
			Northern Arrowwood	III (D)	5 (1)

Total Live Trees: 7+4+(2) 14 **Total Live Shrubs:** 18+(2)

Herbaceous Cover (%): 100%

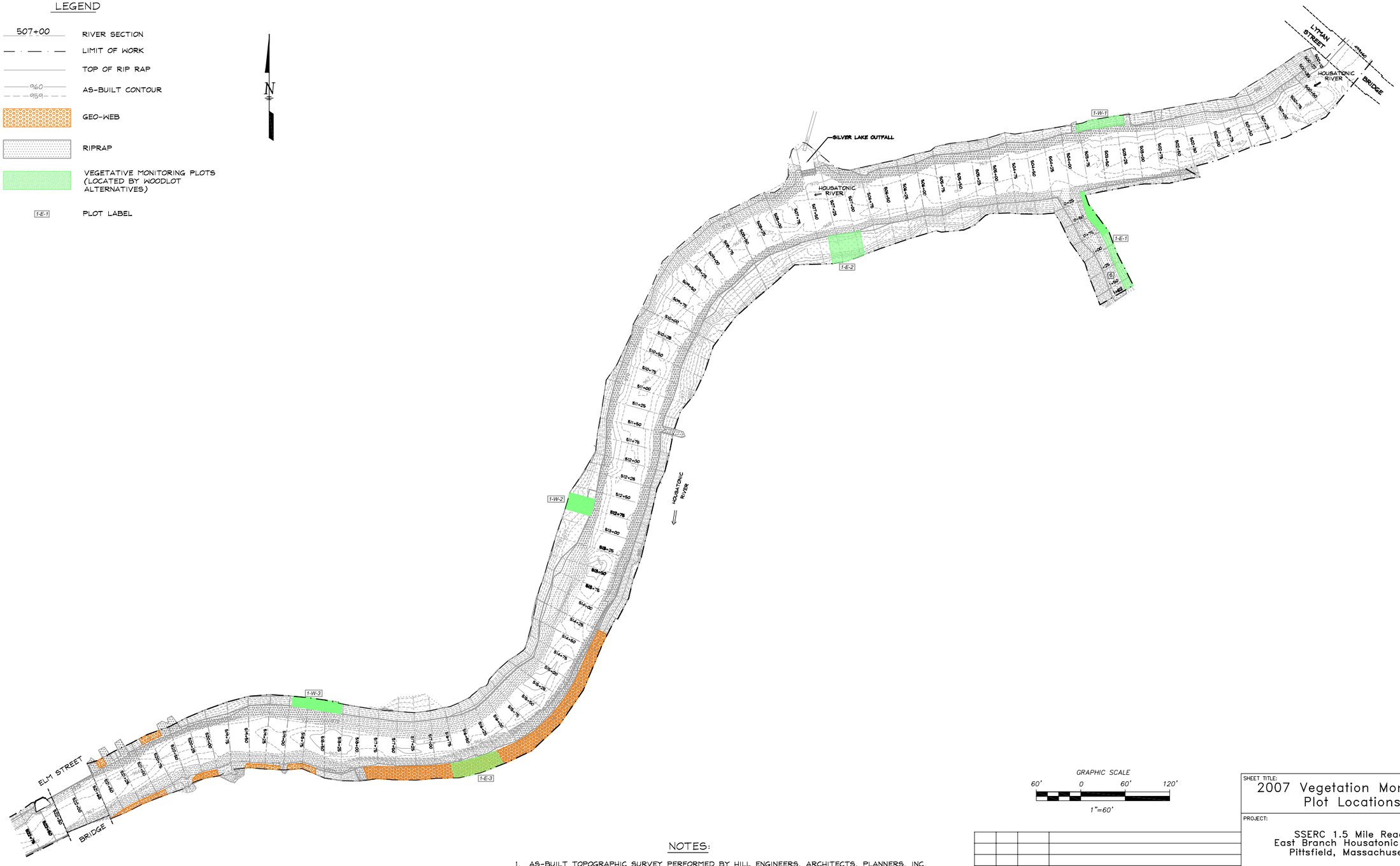
Invasive Plant Cover (%): Spurge, knotweed, <5%

Meander Survey Comments (Use Additional Sheets As Necessary):

LEGEND

- 507+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL

N



GRAPHIC SCALE

60' 0 60' 120'

1"=60'

NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 1

DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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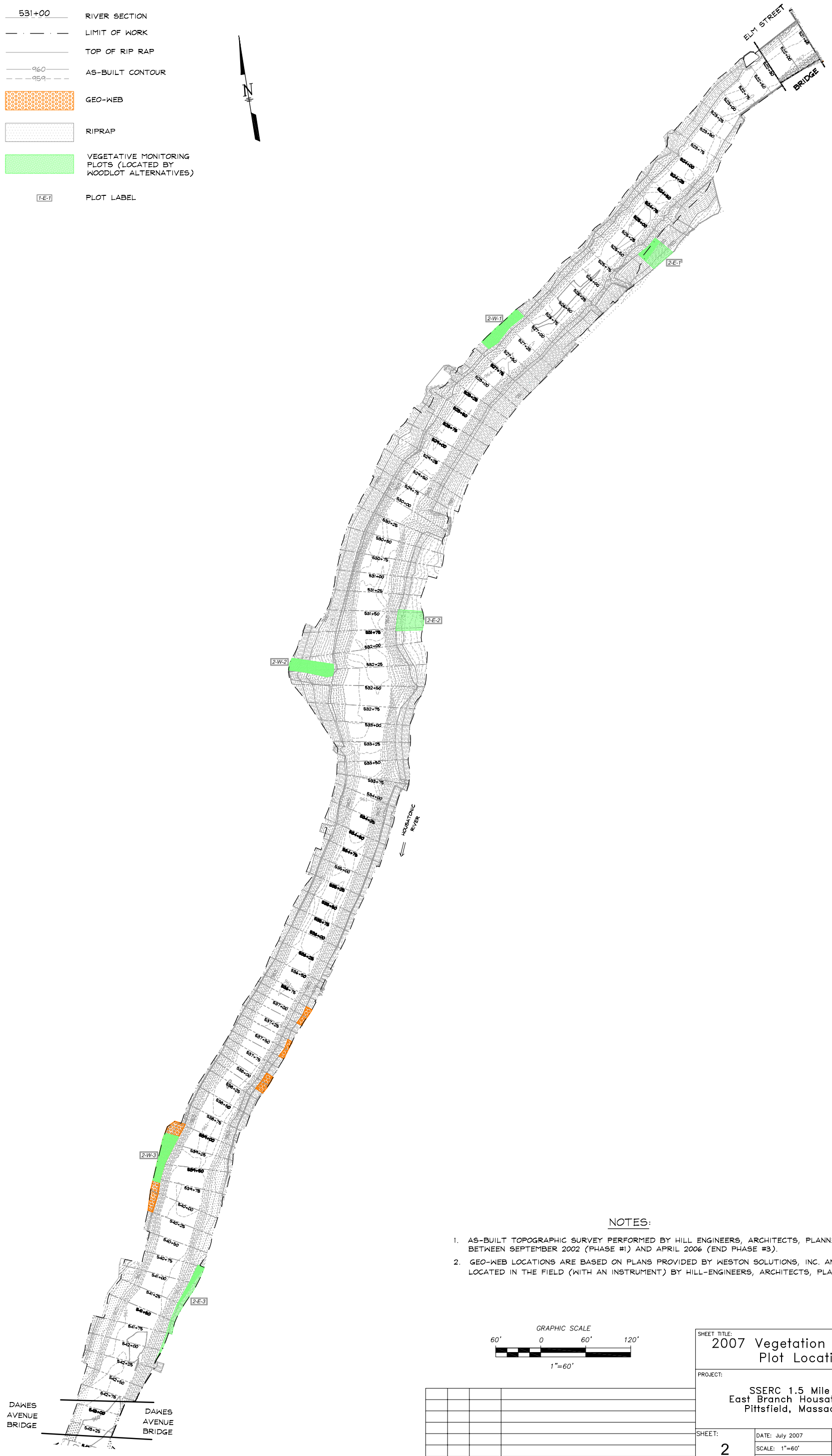
LEGEND

- 531+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL



NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

GRAPHIC SCALE
60' 0 60' 120'
1"=60'

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 2

DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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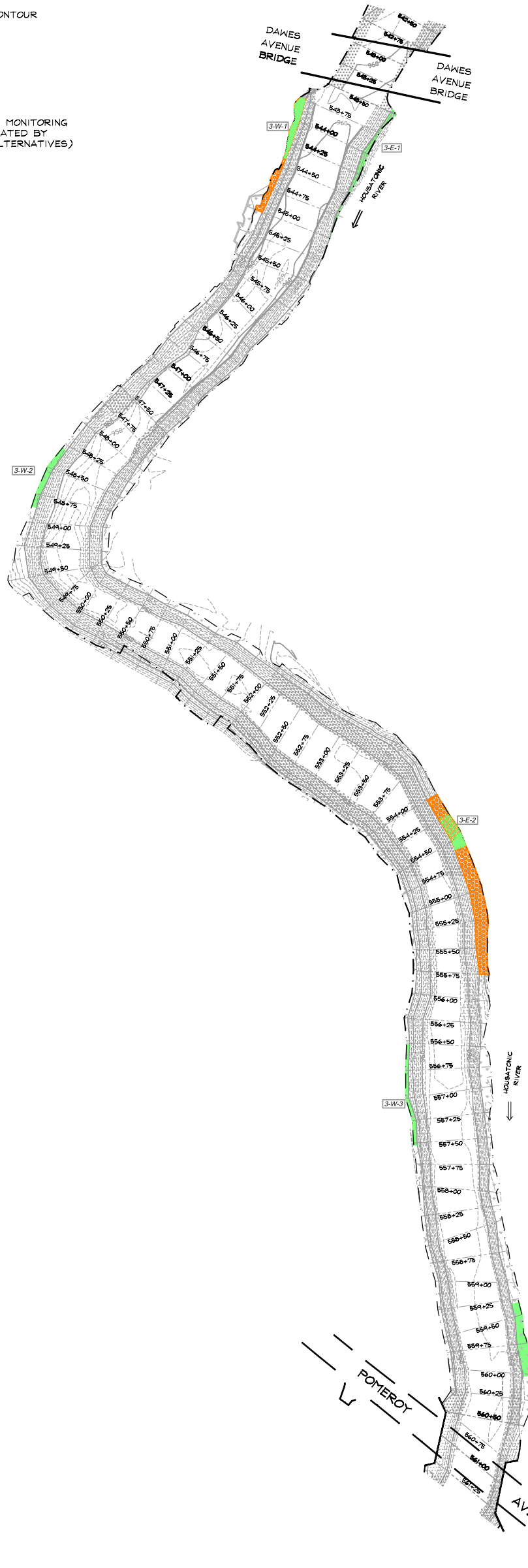
LEGEND

- 531+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 1-E-1 — PLOT LABEL



GRAPHIC SCALE
60' 0 60' 120'
1"=60'

NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 3
DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

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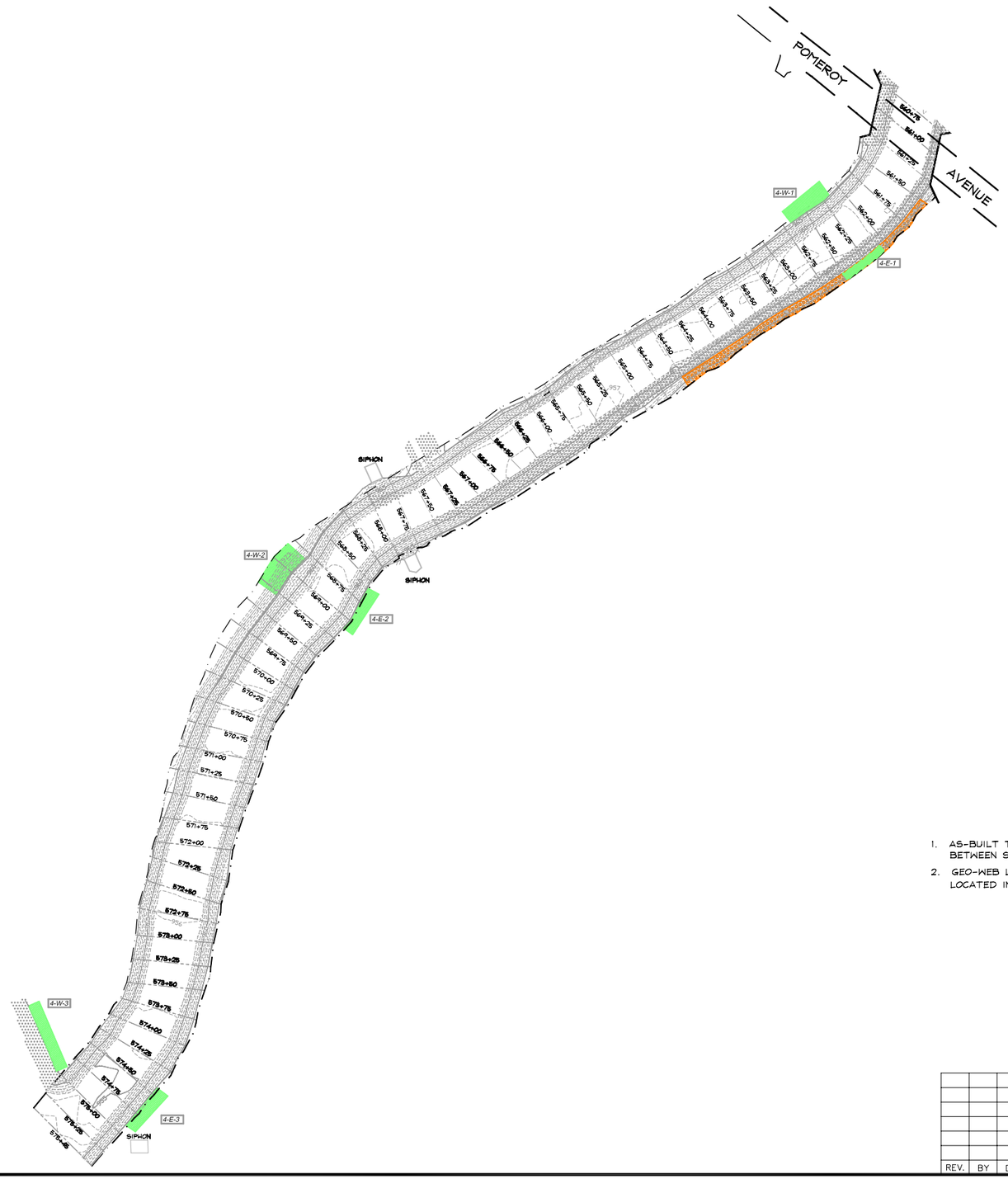
LEGEND

- 562+00 — RIVER SECTION
- LIMIT OF WORK
- TOP OF RIP RAP
- 960 / 959 — AS-BUILT CONTOUR
- GEO-WEB
- RIPRAP
- VEGETATIVE MONITORING PLOTS (LOCATED BY WOODLOT ALTERNATIVES)
- 4-W-1 — PLOT LABEL



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NOTES:

1. AS-BUILT TOPOGRAPHIC SURVEY PERFORMED BY HILL ENGINEERS, ARCHITECTS, PLANNERS, INC. BETWEEN SEPTEMBER 2002 (PHASE #1) AND APRIL 2006 (END PHASE #3).
2. GEO-WEB LOCATIONS ARE BASED ON PLANS PROVIDED BY WESTON SOLUTIONS, INC. AND WERE NOT LOCATED IN THE FIELD (WITH AN INSTRUMENT) BY HILL-ENGINEERS, ARCHITECTS, PLANNERS, INC.

REV.	BY	DATE	STATUS

SHEET TITLE:
2007 Vegetation Monitoring Plot Locations

PROJECT:
SSERC 1.5 Mile Reach
East Branch Housatonic River
Pittsfield, Massachusetts

SHEET: 4

DATE: July 2007
SCALE: 1"=60'
PROJ. NO.: 104141.03

WOODLOT ALTERNATIVES, INC. ENVIRONMENTAL CONSULTANTS

S:\civil\CURRENT2000\SERV-758-57(GEOWEB)\dwg\104141-F105-2006 Monitoring Plots (WOODLOT DRAWINGS 8-7-07).dwg

APPENDIX D

SUMMER 2007 AQUATIC HABITAT STRUCTURE AND RIPRAP MONITORING REPORT

Weston Solutions, Inc.
10 Lyman Street, Suite 2
Pittsfield, Massachusetts 01201
413-442-4224 • Fax 413-442-4447

November 1, 2007

U.S. Department of the Army
New England District, Corps of Engineers
10 Lyman Street
Pittsfield, MA 01201
Attn: Darrell Moore, Resident Engineer

Re: GE/Housatonic River Site
1.5 Mile Reach Removal Action
Monitoring of Aquatic Structures, Riprap, and Riverbank Soil
DCN: GE-110107-ADRK

Dear Mr. Moore:

Weston Solutions, Inc. (WESTON®) is enclosing the final report entitled "*Monitoring of Aquatic Structures, Riprap, and Riverbank Soil, August 15, 2007 Site Visit, 1.5 Mile Remedial Action of the GE-Pittsfield/Housatonic River Site in Pittsfield, MA*" This report presents and summarizes results for the 2007 Summer aquatic structures, riprap and riverbank soil monitoring conducted in the 1.5 Mile Reach of the Housatonic River in Pittsfield, MA.

This submittal has undergone WESTON's technical and quality control review and coordination procedures to ensure: (1) completeness for each discipline commensurate with the level of effort required for the submittal; (2) elimination of conflicts, errors, and omissions; (3) compliance with project criteria; and (4) overall professional and technical accuracy of the submittal.

Please feel free to call me at (978) 779-8904 with any questions.

Very truly yours,

Weston Solutions, Inc.

Joel Lindsay, PE
Task Manager

Enclosures

cc: D. Tagliaferro, EPA
DCN Files

WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS

Memorandum

To: Izabela Zapisek, Weston Solutions, Inc.
Joel Lindsay, Weston Solutions, Inc.

From: Michael Chelminski, Woodlot Alternatives, Inc.

Date: October 31, 2007

Re: Monitoring of Aquatic Structures, Riprap, and Riverbank Soil, August 15, 2007 Site Visit, 1½-Mile Remedial Action of the General Electric-Pittsfield/Housatonic River Site in Pittsfield, Massachusetts

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This memo presents observations made by Woodlot Alternatives, Inc. (Woodlot) following monitoring of aquatic habitat structures and riverbank riprap and soil within the 1½-Mile Remedial Action of the General Electric-Pittsfield/Housatonic River Site in Pittsfield, Massachusetts (1½-Mile Reach) on August 15, 2007. The scope of this work included monitoring in Monitoring Areas 1 through 4 between the Lyman Street Bridge and the confluence of the East and West Branches of the Housatonic River, adjacent to Fred Garner Park, at the upstream and downstream limits of the project reach of the East Branch of the river, respectively. The individual monitoring areas are delimited by the four bridges crossing the 1½-Mile Reach (Lyman Street, Elm Street, Dawes Avenue, and Pomeroy Avenue, respectively, from upstream to downstream) and the confluence of the East and West Branches of the Housatonic River. The four monitoring areas represented by these five delimiters are numbered 1-4, respectively, moving downstream from the Lyman Street Bridge.

The work described here was performed by canoe, starting at the Lyman Street Bridge and finishing at the confluence of the East and West Branches of the Housatonic River. Tom Czelusniak of Weston Solutions, Inc. accompanied Woodlot during this field work. The daily averaged flow during this monitoring work was approximately 20 cubic-feet-per-second, as recorded at the US Geological Survey stream gaging station on the East Branch of the Housatonic River in Coltsville, Massachusetts (Station No. 01197000).

Monitoring Area 1 (Lyman Street Bridge to Elm Street Bridge)

Aquatic Habitat Enhancement Structures – The aquatic habitat enhancement structures appear to be stable, as-built condition and performing as designed, as indicated by variations in current speed, turbulence, and sediment deposition adjacent to the structures (Photo 1). Scour of riverbed or riverbank riprap was not observed adjacent to any of the observed structures. Sediment deposition was observed adjacent to some of the aquatic habitat structures, further indicating that the presence of the structures is providing diversity of aquatic habitat.

Riverbank Riprap – No deficiencies in the riverbank riprap were observed. The riverbank riprap was not observed in areas where sedimented material has accreted (Photo 2). Some exposure of the sheet pile retaining wall was observed along the left (facing downstream) streambank behind the carwash (Photo 3). The observed sheet pile exposure was less than six inches.

Riverbed Riprap – No indications of displacement or failure of the riverbed riprap were observed.

Riverbank Soil – Observations indicate that the riverbank soils are generally stable.

Monitoring Area 2 (Elm Street Bridge to Dawes Avenue Bridge)

Aquatic Habitat Enhancement Structures – The aquatic habitat enhancement structures appear to be stable, as-built condition and performing as designed, as indicated by variations in current speed, turbulence, and sediment deposition adjacent to the structures (Photos 4 and 5). Scour of riverbed or riverbank riprap was not observed adjacent to any of the observed structures. Sediment deposition was observed adjacent to some of the aquatic habitat structures, further indicating that the presence of the structures is providing diversity of aquatic habitat.

Riverbank Riprap – No substantial deficiencies in the riverbank riprap were observed. A small area of exposed geotextile fabric was observed at the base of a riprap swale adjacent to the former access road along the right streambank in the approximate middle of this monitoring area. Some exposure of Geoweb material was observed along the right streambank between the former dam foundation and the adjacent building (Photo 6).

Riverbed Riprap – No indications of displacement or failure of the riverbed riprap were observed. The apparent depth of water is approximately 4 feet immediately downstream of the terminus of the articulated concrete block (ACB), and therefore approximately 3.5 feet below the level of the adjacent ACB. Woodlot recommends that the variation in the elevations of the ACB and the riverbed immediately downstream be checked against the proposed design elevations and as-built drawings to determine whether scour is occurring in this area.

Riverbank Soil – Observations indicate that the riverbank soils are generally stable.

Monitoring Area 3 (Dawes Avenue Bridge to Pomeroy Avenue Bridge)

Aquatic Habitat Enhancement Structures – The aquatic habitat enhancement structures appear to be stable, as-built condition and performing as designed, as indicated by variations in current speed, turbulence, and sediment deposition adjacent to the structures. Scour of riverbed or riverbank riprap was not observed adjacent to any of the observed structures. Sediment deposition was observed adjacent to some of the aquatic habitat structures, further indicating that the presence of the structures is providing diversity of aquatic habitat.

Riverbank Riprap – No deficiencies in the riverbank riprap were observed. The riverbank riprap was not observed in areas where sedimented material has accreted (Photos 7 and 8).

Riverbed Riprap – No indications of displacement or failure of the riverbed riprap were observed between the bridges delimiting this monitoring area. Some erosion of riprap was observed under the left abutment of the Pomeroy Avenue Bridge immediately adjacent to a culvert that discharges through the bridge abutment wall (Photo 9).

Riverbank Soil – Observations indicate that the riverbank soils are generally stable.

Monitoring Area 4 (Pomeroy Avenue Bridge to Confluence)

Aquatic Habitat Enhancement Structures – The aquatic habitat enhancement structures appear to be stable, as-built condition and performing as designed, as indicated by variations in current speed, turbulence, and sediment deposition adjacent to the structures. Scour of riverbed or riverbank riprap was not observed adjacent to any of the observed structures. Sediment deposition was observed adjacent to some of the aquatic habitat structures, further indicating that the presence of the structures is providing diversity of aquatic habitat.

Riverbank Riprap – No deficiencies in the riverbank riprap were observed. The riverbank riprap was not observed where sedimented material has accreted (Photo 10).

Riverbed Riprap – No indications of displacement or failure of the riverbed riprap were observed.

Riverbank Soil – Observations indicate that the riverbank soils are generally stable.

A substantial area of algae was observed immediately adjacent to the inverted sewer siphon along the right bank. Woodlot recommends that the cause of the algae growth be evaluated.

Photographs

Photo 1: Aquatic Habitat Structures, Monitoring Area 1

Photo 2: Sediment Material, Monitoring Area 1
Right Bank Looking Upstream at Lyman Street Bridge

Photo 3: Area of Sheet Pile Exposure, Monitoring Area 1, Left Streambank

Photo 4: Aquatic Habitat Structures, Monitoring Area 2
Looking Upstream at Elm Street Bridge

Photo 5: Riffle/Run Development, Monitoring Area 2

Photo 6: Area of GeoWeb Exposure, Monitoring Area 2
Right Streambank

Photo 7: Sediment Material, Monitoring Area 3
Right Bank Looking Upstream at Dawes Avenue Bridge

Photo 8: Aquatic Habitat Structures and Vegetated Streambanks, Monitoring Area 3

Photo 9: Scour Adjacent to Culvert Discharge
Left Abutment of Pomeroy Avenue Bridge

Photo 10: Riverbanks and Aquatic Habitat Structures, Monitoring Area 4

APPENDIX E

APRIL 24, 2007 POST HIGH-FLOW INSPECTION REPORT

WOODLOT ALTERNATIVES, INC.
ENVIRONMENTAL CONSULTANTS

Memorandum

To: Izabela Zapisek, Weston Solutions, Inc.

From: Michael Chelminski, Woodlot Alternatives, Inc.

Date: May 7, 2007

Re: Post 1,500-CFS Hydrologic Event Inspection, April 24, 2007

Woodlot Alternatives, Inc. (Woodlot) performed monitoring of riprap, aquatic habitat enhancement structures, and streambank vegetation on the 1.5-Mile Reach of the Housatonic River on April 24, 2007, in accordance with the post-1,500-cubic-feet-per-second (cfs) monitoring requirements set forth in the May 2004 1.5-Mile Reach Restoration Monitoring Plan. The monitoring was performed in response to a hydrologic event on April 16 and 17, 2007, during which a peak flow of 1,670 cfs was recorded at 1:00 AM on April 17, 2007, at the United States Geological Survey (USGS) stream gaging station (No. 01197000) on the East Branch of the Housatonic River in Coltsville, Massachusetts.[1]

Flow during the post-event monitoring work was approximately 360 cfs, as recorded at the USGS Coltsville gage. The monitoring work was performed by walking along the riverbank and looking for observable effects on the riverbed and riverbank from the high flow event. The magnitude of the April 16 and 17, 2007, flood event did not apparently result in overtopping of the installed riprap in Monitoring Areas 1, 2, and 3. Observations suggest that overtopping of the riverbanks may have occurred in the lower section of Monitoring Area 4 immediately upstream from the confluence of the East and West Branches of the Housatonic River. No indicators of disturbance to planted stock resulting from this event were observed. The streambed armor was not readily observable during the monitoring work due to high water and poor clarity and therefore is not discussed here.

Monitoring commenced at the upper limit of Monitoring Area 1 (formally referred to as the Phase 1 Reach) immediately downstream of the Lyman Street Bridge, and proceeded downstream through Monitoring Areas 2, 3 and 4 to the downstream limit of the 1.5-Mile Reach at the confluence of the East and West Branches of the Housatonic River. The monitoring work in Monitoring Area 1 included traverses of both the right and left banks of the river. While the riprap on both banks was readily observable from the right bank, the left bank traverse was performed to observe possible areas of erosion along the access road in this area. The balance of the monitoring work in Monitoring Areas 2, 3, and 4 was performed from the west (river right) bank of the river.

Monitoring Area 1

No deficiencies in the observed riverbank riprap were observed in Monitoring Area 1. Minimal exposure of sheetpile was observed along the left bank adjacent to the carwash facility. Some exposure of Geoweb

[1] As reported on the USGS station website (http://waterdata.usgs.gov/ma/nwis/uv?format=html&period=7&site_no=01197000).

30 Park Drive Topsham, Maine 04086 Phone 207-729-1199 Fax 207-729-2715
E-mail: mail@woodlotalt.com Web Site: http://www.woodlotalt.com

material was observed on slopes immediately upstream of the Elm Street Bridge. This may have resulted from settling of soil, as no indicators of recent erosion were observed. Minor rill erosion was observed at the upper limit of the planted areas at one location along the right bank and at a number of locations along the left bank adjacent to the dirt access road.

Monitoring Area 2

Woodlot observed what may be exposed granular filter material at Station (STA) 529+25 along the west (right) streambank in Monitoring Area 2. Geotextile material was observed in a constructed swale along the west streambank adjacent to the former construction access road. No movement of riprap was observed in the vicinity of the terminus of the articulated concrete mat in STA 524+00.

Monitoring Area 3

No deficiencies were observed in Monitoring Area 3.

Monitoring Area 4

No deficiencies were observed in Monitoring Area 4.